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DIRECTIONS TO BINDER.

Vol. XXXVII. has been issued in three numbers, each containing the "Journal" proper, *paged with Arabic figures*, and "Extracts from the Proceedings," *paged with Roman figures*. This title and contents sheet should be placed first, and be followed by pages 1 to 288, then by pages 289 to 496, and then by pages 497 to 648. After that should come the "Extracts from the Proceedings," *pages i to lxxxvi, lxxxvii to clxxviii, and clxxix to celxxxii, concluding with the Index.*

JOURNAL

OF THE

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VOL. XXXVII. 1911.

PART I.

SINGLE SEED SELECTION.

By G. F. SCOTT-ELLIOT, M.A., B.Sc., F.L.S.

[Being the fifth 'Masters Lecture,' delivered February 28, 1911.]

IN modern botanical literature, perhaps no questions have aroused greater interest and been more thoroughly investigated than the development of the ovule and the cytological phenomena which accompany fertilization.

The results achieved are, no doubt, of the greatest value, but they do not give any explanation, at least so far as my information is concerned, on one special mystery which has always fascinated me.

What connexion exists between the developing embryo and the mother plant?

In some cases one might almost say that the young seed behaves like a parasite. It is nourished at the expense of the mother, very much as parasitic fungi or cecidia might be. There is apparently no obstacle, nothing to prevent the freest possible interchange between the developing germ and the tissues of the ovule.

The effect of fertilization cannot, of course, be minimized, but, however great may be the influence of the sperm nucleus, it is surely certain that the protoplasm, the enzymes, and the proportions existing between these enzymes, of the developing embryo must be dependent on those which exist in the mother plant.

Even after fertilization has occurred and after the palisade of cunningly-designed strengthening cells has separated off the future seed, it is very hard to understand how there can be any essential difference between the cell structure, enzymes, and protoplasm of the seed and those of the original plant.

It may seem at first sight unnecessary to dwell upon this point, but

upon the question of the difference or similarity of the substances in seed and seed-parent depend all theories of inheritance.

I know of nothing which could be taken to prove that there is any essential difference between the material of the germ and that of the mother plant.

On the other hand, there is much indirect evidence which goes to show that there cannot be any interference with the freest transference of material between the two.

The difficult experiments in Mendelian inheritance which have been so brilliantly carried out by Professor BATESON and his pupils, and by many others, surely show that those enzymes or physical states, or whatever it is that produces a colouring material, must be regularly transferred both by pollen and by ovule.

Those experiments would be quite unsatisfactory if there were the slightest doubt on this point.

The fact that it is quite possible to grow a plant from small pieces of a root or of a stem or even possibly of the endosperm, and that the plants so formed are normal and bear flowers and fruit, tends to show that the cells of a plant have, up to a certain point, all things in common.

There are well-known facts of selection and propagation which point to similar conclusions. Take, for example, Mr. EAST's experiments in Illinois. In testing the relative production of large and small potato tubers, he discovered such interesting results as the following:—

The large tubers of a particularly prolific individual yielded 319; small tubers of the same plant gave only 220.

On the other hand, tubers of a plant which was found to have given a very poor crop, showed for large tubers 113 and for small tubers only 80.

Now, whatever it was that brought about the difference in production between these two individuals, it does not seem possible to deny that the quality or material was inherited.

A similar result has been found by others with, for example, sugar-cane. KOBUS found that heavy plants had heavy offsprings, and that those canes which were themselves richest in sugar produced suckers which were also rich in sugar.

It would be easy to quote many other experiments which all go to show that the enzymes or proportionate mixture of enzymes and also that whatever constitutes vigour or fertility are not specially limited to one part of the plant, but are common to all parts of it. If so, it would be very difficult to prove that the germ-cell or the ovule is in any way debarred from participating in this common holding.

If, for instance, a particular plant has withstood some fungus disease or insect attack, that is due perhaps to a specially vigorous constitution, perhaps to some specially evolved ferment, or it may be to an accidental balance in the proportion of its ferments. But whatever the ferments or their "anlage" may be, they cannot be excluded from the developing germ-cell.

It is this point which I have steadily maintained during the last twenty years.

For a very long time the various evolutionary stages of Weismannism made it impossible to give my opinions, but I am thankful to say that *now* there is plenty of good authority for the inheritance of adaptive characters.

Many authors still feel obliged to go through a sort of formula to the effect that "all acquired characters must affect the germ before they can be inherited."

I myself have never felt the necessity of reciting this formula, for I do not know how you can grow a plant from seed without a germ-cell.

The reason for my objection to Weismannism is the unfortunate result of that theory in discouraging and making unfashionable a line of research that has in the past proved of the greatest value and which is now at last again being taken up and with excellent promise.

In one respect we have every reason to be proud of our national contribution to the science of plant-breeding.

Neither the scientific training of Germany nor the elaborate organization of Denmark has enabled those countries to show so good a harvest from the acre as is the case almost every year in Britain. The all-over average of our returns of wheat, oats, and other crops from each acre of land is in this country almost always greater than anywhere else in the world. Almost every Annual Return of the Board of Agriculture brings out this gratifying fact.

Is this due to any specially favourable conditions as regards soil or climate? No one would seriously uphold such a proposition.

Is it due to any advantage in scientific education or botanical skill? I am afraid not!

It seems probable that our land system, and especially the unfortunate proprietors of land, have largely contributed to the success of British agriculture in this respect, but the credit is due chiefly to four or five men who were never recognized as scientists.

PATRICK SHIRREFF of Haddington, LÉCONTEUR of Jersey, and HALLETT of Brighton are those who seem to have been the pioneers in plant-breeding. It is quite unnecessary for me to describe their achievements in detail, for they are carefully described in DE VRIES' *Plant Breeding* and elsewhere.

Their methods were the simplest possible. They just selected the very best seed of the most vigorous plant, and the results achieved by them and their adherents antedated by many years the modern science of plant-breeding.

Fortunately this line of research has never been abandoned altogether.

One of the most interesting papers which I have come across is that describing certain experiments with maize, carried on by LOUIE H. SMITH for the ten years from 1896 to 1906.

Indian corn is a very important crop in the United States, where many varieties are in cultivation. The object of these experiments was

to produce four distinct races or varieties. One of these was to be particularly rich in proteids (which is important for its use as feeding stuffs); another variety was to have as low a percentage of proteid as possible (for use in the manufacture of glucose). Another race was to have a high oil content (such a race would be useful in many arts), and the fourth race was to have the smallest possible percentage of oil.

The experiments began in 1896, and until 1906 the seeds were specially tested and selected for all these four different qualities. The seed selected in 1897 as being highest in protein contained 12.54 per cent. of protein. In 1906 the *average* of the high protein plot had risen to 14.26 per cent. Individual seeds in 1906 had as much as 16.3 per cent.

In the reverse experiment to reduce the percentage of protein, the results were not quite so remarkable. The average proteid content in the original crop was 10.92 per cent. The seeds selected as lowest in 1896 had 8.96 per cent. In 1906 the *average* in the low proteid plot was down to 8.64, and seeds had been sown with only 7.21 per cent.

So that in ten years from an average of 10.92, seed as rich in protein as 16.3 and as low in proteid as 7.21 had been obtained.

Similar results were obtained in the development of high and of low oil percentages. In 1896 the average oil content was 4.7 per cent. The first seeds selected for high oil had 5.39 per cent.; but the average in 1906 had risen to 7.37 and seeds with 7.86 had been obtained.

The seeds sown for low oil percentage in 1897 had only 4.03; the average in 1906 was 2.60 per cent. and seeds with only 2.20 per cent. had been obtained.

These results are of the greatest interest not only in practice but in theory. They show what extraordinary results can be obtained by steady and careful selection.

But in any ordinary crop what is wanted is the largest possible return, not so much any particular difference in chemical constitution.

To improve any ordinary crop, therefore, the obvious course is simply to select the largest and heaviest seed.

Of recent years many experimenters have tried this method with success. ARTHUR, for instance, sowed large, medium, and small peas on plots of equal size. He found that the largest seed resulted in plants with more stem, more foliage, but especially a greater proportionate increase in the weight of seeds harvested.

I could mention many other experiments which confirm these results, but shall only give details of those which I think are of the very first importance.

I allude to the great series of elaborate cultures made by ARNOLD ENGLER and CIENLAR with the seeds of Scotch Pine, Larch, and Sycamore in Switzerland.

One of the most interesting of these experiments, or rather series of experiments, was an attempt to test carefully the difference in general vigour of the descendants of large, medium, and small seeds.

There were four sets of each size of seed, and as in every case the

result given is the average of a number of seedlings, the experiments seem to be fairly conclusive on the point.

The results are quoted in his classical paper Table V., p. 116, and are as follows:—

The average height above ground of the four series of large seeds of the same species was 7.9 cm. and the weight 87 grams; seedlings of medium seed were 7.1 cm. in height and weighed 46 grams. The offspring of the small seeds averaged 6.4 cm. in height and 43.1 grams in weight.

The difference in individual series was even more pronounced, but these average results are most instructive.

Professor ZAVITZ, of the Guelph College, Ontario, has also achieved extraordinary success by the method of single seed selection.

In one well-known experiment he selected one single grain of Joannette oat. This seed was sown in 1903. The whole of the grain from it was again sown, and with the result that in 1905 this single seed's descendants produced a harvest of 100 bushels of grain and 8,748 pounds of straw!

There is also one point with regard to this method of single seed selection which should appeal to everyone. Most researches in plant-breeding involve enormous expense, elaborate apparatus, and specially trained experimenters.

But single seed selection is within the reach of every gardener or farmer; the greatest possible care must, of course, be exercised, but that is really all that is necessary.

Some small experiments of my own were undertaken in order to test whether there could be, as one seemed to gather from the evidence, any marked result produced by the selection of seed.

The theory had not really much chance in this case, for the seeds with which I worked were taken from ordinary commercial packets supplied by one of the very best seedsmen in Britain.

All these seeds were therefore good and selected and all of the same variety.

I simply picked over a packet and selected the ten best and largest seeds, the ten smallest, and ten which seemed to be of about average size. The differences in size were not really very marked, and I was not at all hopeful as to the results being of any interest. In the experiment with Broad Beans, I got from A (the ten largest seeds) 77 beans, from the small seed C only 48. The weight of the whole crop A was also 80 per cent. heavier. With Cauliflowers the A plants were unfortunately destroyed by an accident, but the difference between the B plants and C plants was very marked indeed. The size of the heads from medium seed was obviously much greater and they were much more symmetrical than those from C. With Beetroot the average weight of 7 B plants (medium) was 2.5 oz.; that of 5 C plants only 1.7 oz. With Turnips I could distinguish no particular difference between B and C rows.

These small experiments convinced me that even with selected

seed of very good varieties there is always room for improvement by selecting the best and heaviest seeds.

But it is especially with reference to the seeds of forest trees that the importance of selection is most urgent.

When a seedling starts life with the richest store of nutriment possible, it is surely better able to resist all sorts of diseases and enemies. In the small series of experiments which I have mentioned, it was quite obvious that the C plants were much more affected in every case by injurious fungi or by slugs and insects than the B and A plants.

With tree seeds the danger of such attacks is a very serious matter. I think I can best show this by shortly considering a question which is at present much discussed in Scotch Forestry circles and which is of serious urgency to all owners of woodlands. There is no doubt that Scotland can produce magnificent larch. One finds splendid old trees in almost every part of the country. But young plantations, and especially those of ages between ten and fifty years, are in many places so badly attacked by the *Peziza Willkommii* that many proprietors have, in despair, abandoned larch altogether and taken to planting spruce. When one remembers that spruce timber may be worth 6d. to 7d. a cubic foot, whilst larch should be worth at least 1s. 2d. to 1s. 4d. a foot, the serious loss involved by the failure of larch is obvious enough.

The really important point is to know whether the evil state of so many of our Scotch larch plantations is due to some inherent inferiority in the seed or to something else, perhaps to unsuitable habitat or careless Sylviculture. Now one of the best Continental authorities, Professor CIESLAR, states that the *Peziza* disease of larch may be due to any one of the following agencies: deer breaking the branches or peeling the trunk, damage through heavy snow breaking down the branches, injury due to insect attacks in the nursery, want of sunshine, an unsuitable position, such, e.g., as a damp hollow where the air is stagnant and humid, ground which is too wet or waterlogged, or ground which is too dry with a poor soil.

According to his opinion, any one of these various causes may lead to a dangerous epidemic of "blister" or *Peziza*.

Now it is, I am afraid, indisputable that larch is very often planted in quite unsuitable localities.

I have myself seen a young larch plantation on a perfectly flat peat moss with a subsoil of stiff clay. Of course these larches will die in any case, but it so happened that it was not the *Peziza* but *Hyllobius* that was chiefly active in destroying them.

But although in many other cases it is not difficult to see why larch plantations have not succeeded, yet the fact remains that magnificent larch has been grown in Scotland.

Moreover, the seed from which all the oldest larches were grown was, of course, Continental seed. Home-grown seed can hardly have been used until about fifty or sixty years ago.

So far as one can judge from the scanty records available, the use of

home-grown seed coincided with the serious outbreak of larch disease which has been unhappily so prevalent.

There are certain considerations also which seem to make it probable that larch seed hardly has the chance of ripening properly in Scotland. The natural home of the larch in Europe has been carefully described in KIRCHNER, LOEW and SCHRÖTER's recent work.

It extends from latitude $44^{\circ} 30'$ N. in French Dauphiné to Kronstadt. The northernmost point is about Gabriz.

In one important point the climate of all the area so outlined differs very widely from that of Scotland.

No part of Caledonia enjoys so much as 1,400 hours of sunshine in the year, whilst in the larch's natural country there must be everywhere at least 1,700 hours and in many districts even 2,000, possibly 2,200, hours of sunshine.

Without more exact information as to the sunshine conditions in the critical period during which the larch seed is maturing and developing, it is impossible to be dogmatic on the subject.

It would be interesting to compare a large series of samples of Scotch and Continental seed in order to find whether there is a marked difference in respect of size and weight of seed.

Certain Scotch samples which I have myself examined were undoubtedly lighter, smaller, and not so well developed as the Continental ones selected for comparison, but, naturally, a very large series of observations are required before anything definite can be said on the subject.

I am afraid also that in many cases Scotch seed is neither collected with the same care nor cleaned with the skill and method which prevails in Germany.

On the whole it certainly seems advisable now to choose the best Continental larch seed.

I have been able to compare the results for a few plantations in which the origin of the seed has been recorded.

These reports are unanimous regarding the greater prevalence of disease in those woods which were grown from Scotch seed. In fact, Continental and especially Tyrolese seed is preferred by all those whom I have consulted, chiefly for this reason, but also because, in their opinion, the germination results are much better and the seed is much cleaner and better preserved.

The Tyrolese seedlings in the nursery seem, however, to be more affected by frost when in the nursery than home-grown seed.

If this last observation is justified by further experience, it is an interesting case of hereditary influence. ENGLER in the paper already referred to mentions that the seedlings of those Sycamores which had lived at very high altitudes in the Alps inherited their parents' periods of coming into foliage and of shedding the leaves.

But the main point which I wish to make is that there is an obvious advantage in selecting the very finest, largest, and best seeds, especially in the case of forest trees. It is almost certainly the case that, if this is

done for larch, Continental and especially Tyrolese seed will prove the largest and best, and should therefore be chosen.

Even if larger and finer Scotch seed were to be found, there is still, I think, a probability that the Tyrolese should be preferred.

In Scotland we cannot afford to run risks in forestry. I am a strong believer in the future of Scotch forestry, but the whole labour and cost of some twenty years of work may be entirely thrown away if the seed used has been, just by a little, less good than it might have been.

At any rate the fact remains that there is ample evidence to show that with all plants, and especially with trees, there is a distinct advantage in selecting the largest and finest seeds for stock. Such seed yields vigorous youngsters able to withstand all infantile enemies and thereby to succeed in after life under conditions in which weaker plants remain permanently enfeebled.

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CHANGING OF SPECIES.

By G. F. SCOTT-ELLIOT, M.A., B.Sc., F.L.S.

[Being the sixth 'Masters Lecture,' delivered March 14, 1911.]

As I tried to show in the previous paper, seedlings in most respects resemble their parents. If their parents are strong, vigorous, and hardy, then the seedling is healthy and well-doing. If the father and mother are weakly, then the descendants also will be weak, wanting in virility and very likely unable to survive one or other of the infantile maladies usual to its species.

When a seed is well formed, weighty, and plump and packed full of nutritious substances, the young plant will have the best possible start in life; it will in all probability keep indefinitely the lead due to its excellent outfit and will probably remain always ahead of those of its competitors who were not in their infancy so well provided for.

That this is true is a matter, as I tried to show, not only of common knowledge but of common sense, and the truth of this view is supported by whole arrays of carefully conducted experiments carried out by observers of acknowledged reputation.

Under ordinary conditions a young plant inherits not only its parents' constitution but also their conditions of life. It lives in essentially the same climate, it has to withstand the same sort of enemies, whether fungi or insects, which assailed its forefathers. It is subject to April showers, May frosts, and June sunshine quite similar to those which have continually affected not only its parents but their ancestors for thousands of years.

The continuity of species under continuously similar conditions is precisely what we should expect, and although this apparent immobility has often been used as an argument against possible changes of type, it has really nothing to do with the real question.

The real point is whether a distinct change of conditions can alter in any way the characteristics of a species.

A flowering plant is a complex organism with habits and rhythms strongly fixed and dependent on complicated series of cell divisions; the change must be of the most radical and ruthless character if all these successions and their effects are to be suddenly altered.

In the simplest unicellular organisms such as bacteria and yeasts, the dependence of the character of the organism upon its environment is perfectly obvious. Such organisms are indeed usually classified by their reactions and behaviour in the various media in which they can be cultivated.

Under skilful treatment bacteria originally of the most dangerous character can be made perfectly innocuous or, if one desires to do so, they can be so altered that they are infinitely more virulent and

deadly than the race as it is found under natural conditions. The reactions of *Saccharomyces* can also be at once altered by changing the composition of the sugars in which it is cultivated. These points are so familiar to students of bacteria and yeasts that perhaps the full significance of them is hardly realized.

Fungi are also exceedingly adaptable, as is shown by many well-known facts.

Thus the manner in which the various races of one species of *Puccinia* and of other Uredineae have become so specialized that they can infect only one out of many possible host-plants, seems to me to show that they have managed to produce just the particular excretion which in any one case will overcome the resistant excretion developed in the particular flowering plant which is invaded.

Nor have they lost the power of developing new excretions when an occasion presents itself.

Soon after the South African *Nemesia* was introduced into European gardens, the Scotch Fir Rust managed to attack and establish itself in a perfectly new host-plant, and in all probability a new biologic race of this fungus will be formed.*

This adaptability is not confined to the Uredineae, for quite similar biologic races have been discovered in *Ustilago*, *Claviceps*, and *Erysiphe*. Special forms of all these fungi appear to exist, each adapted to attack one particular species.

MASSEE† has recorded a most interesting experiment in which he, by skilful and sympathetic assistance, made it possible for a fungus, which had previously never had anything to do with Begonia, to become a regular parasite of that plant and able to establish itself on perfectly healthy leaves. CHITTENDEN‡ has also suggested that the common saprophytic fungus *Cladosporium* has become regularly parasitic on the apple tree. SALMON§ experiments are also very interesting in this connexion, as they give a clear explanation of the probable manner in which infection occurs.

Perfectly healthy leaves will resist the poisonous excretions of invading fungi, whilst diseased leaves are unable to do so. Quite a slight injury seems to be decisive in battles of this kind.

If a small piece is sliced off a leaf, it is unable to resist the enemy: when a hot razor was pressed for a few seconds against the upper surface, the vitality of the leaf was just by so much impaired that the fungus enemy could make good its hold.

SORAUER and CIESLAR|| have also in several instances pointed out that both fungi and insects can settle themselves on sickly or injured plants, whilst those which are in full vigour are either immune or recover after a slight struggle.

The point which seems clearly brought out by all these experiments

* Fischer, *Atti Soc. Elv. d. Locarno*, 1903.

† Massee, *Journ. R.H.S.* Vol. 28; *Proc. R.S. Ser. B*, 1904.

‡ Chittenden, *Journ. R.H.S.* Vol. 33. Part 2, p. 509.

§ Salmon, *Trans. Royal Soc.* 1904, p. 107.

|| Soraauer, *Zeit. f. Pflanzenkrankh.* Band 10, Heft 6.

is that both fungi and the higher plants are, if in full vigour, able immediately to adapt themselves to changed conditions.

The weapons on both sides are excretions of some kind. A new and hitherto unexperienced poison seems to be at once countered by the defender producing a novel anti-body. If this is a correct description of what happens, then undoubtedly vegetable protoplasm has the power of adapting itself to a new environment.

The flowering plants are, of course, infinitely more difficult to change than unicellular organisms or fungi. Still there are cases admitted by most botanists and which seem conclusive enough.

Changes are certainly brought about by a difference in the salts in solution absorbed by the roots.

The special races which occur on limestone and on serpentine are well known and have been fully discussed by many authorities, and it is hardly necessary to refer to them. But certain experiments with solutions of common salt are perhaps of more interest in this connexion.

It has been found that wallflowers when watered with salt solution are distinctly changed. Their leaves become fleshy, or, as one might say, halophytic. This expedient is not new, but has recently been confirmed by BOODLE.* The power of adaptation to various concentrations of salt has been directly studied both by TERRAS† and HILL.‡ The former had managed to accustom the root-hairs of a *Salicornia* to live in a solution of 5.8 per cent. of common salt. It was then placed for two hours in a 1 per cent. solution, but when it was again placed in a 5.8 per cent. solution, the protoplasm of the root hairs was at once plasmolysed.

Nor are these the only instances which could be mentioned of this power of adaptation in direct response to change in the constitution of the root water.

Ordinary seeds will not germinate in salt water, and yet the seeds of some salt plants will only germinate in salt water.

The orchid *Laelia purpurata* is another curious instance for, according to NOEL BERNARD,§ the seeds can develop only if a special fungus is present.

Some of those who have recently studied the flora of peat mosses seem to think that there is a peculiar substance, probably an enzyme, present in all peaty soils, and that is the reason why the flora is so scanty (DACHNOWSKY).|| Only those plants which can manage to adapt themselves to this particular substance are able to survive in such soils.

There are also certain direct experiments which show that there is a possibility of altering the constitution of plants by altering the composition of the water supplied to the roots.

MASSEE (as described in our Society's *Journal* vol. 28) was able to obtain races of both Cucumber and Tomato which were immune to

* Boodle, *New Phytologist*, 1904.

† Terras, *Proc. Scot. Micr. Soc.*, vol. iv.

‡ Hill, *New Phytologist*, vii. 1908.

§ Noel Bernard, *Comptes Rend.* 1903.

|| Dachnowsky, *Botan. Gazette*, xlv. Aug. 1908.

certain dangerous fungus diseases by simply watering the plants with a very dilute solution of copper sulphate.

Others, notably MOKRZECKI,* have actually cured plants by the injection of chemicals. In one experiment this author cured an apple tree which was badly affected by the "yellows" or chlorosis. He introduced 12 g. of iron sulphate into the stem and in three weeks he found that the leaves were all healthy and dark green. In fact all trace of the disease had vanished. Nor is it only possible to introduce solutions by the sap current, for when teaching botany in Glasgow I found it possible to introduce coloured solutions into the sieve tubes. The system was not an elaborate one; I made a funnel of plasticine round the stem and filled this with a coloured solution. Then with a sharp knife I cut, under the liquid, into the bark not deep enough to reach the wood. It was easy to show by a subsequent microscopic examination that the coloured solution had travelled by the sieve tubes and also entered the medullary rays.

It would be, I think, quite possible to grossly overfeed some particular bloom with a specially nutritive material and perhaps produce something unusual.

But quite apart from these special surgical treatments, there is surely enough evidence to show that the higher plants do sometimes respond in direct answer to changes in the character of the solution supplied to their roots. The root system appears to retain some traces of that susceptibility which is so markedly evident in bacteria and various fungi. It is in fact able to adapt itself to the direct action of its environment.

But is that all that one can say on this point? It is easy to see that bacteria and yeasts are immersed in their culture media and can hardly help responding at once to any change in it.

We never think of flowering plants as being similarly surrounded and enclosed in their atmosphere. The beautiful researches of BLACKMAN and others have shown us something of the various currents of carbonic acid, of water vapour and of oxygen, varying both in rapidity and in amount which are always entering or leaving the surface. Sunlight falls upon the leaf surface, but there are all sorts of wave lengths, and the intensity of the light is always changing. There may be electric currents of which little or nothing is as yet known with certainty. I cannot help thinking that these complex influences, always part of the *milieu* of a living plant, are as powerful to alter the delicate balance of its protoplasmic secretions, as for instance the proportion of salt in the root water.

Engine smoke, fog, ozone, carbon monoxide and sulphur fumes seem at once to affect living vegetable tissues though generally in so poisonous a manner that the cells have not time to adapt themselves to their effects.

* Mokrzecki, *Zeit. f. Pflanzenkrankh.* Bd. 13, Heft 5.

But the changes in climate which occur in nature are of quite a different character.

On the borders of the Sahara, for instance, one finds many species which are trying to colonize a country in which they have no experience.

What happens under such conditions can be easily seen in, for instance, Tripoli or Egypt. The influence of the arid conditions affects every plant of every species. The death-rate both of species and of individuals in surviving species is enormous, but one can distinctly see the effects of drought reflected in the endeavours of every plant to take on some modification which will enable it to survive.

I do not wish to say much of my own personal experiences as a travelling botanist, but the real evidence for the effect of environment in altering species must be sought by field observations extended over many floras.

It is perhaps in South Africa that the sharp limitations of quite distinct floras according to climate are most clearly seen. The Karoo, the Cape Flats, Table Mountain, South Eastern Cape Colony and Natal show these differences in quite unmistakable manner. But the dependence of species on climate is quite as clearly marked in, for instance, Madagascar; the grassy plains and rocky hills of Imerina are inhabited by a flora which is utterly different from the feverish jungle of the hillsides. In Chile the evidence is equally clear. The gradual changes in flora from the miserable stunted antarctic beeches of the Straits of Magellan to the beautiful temperate forest of Valdivia and the arid thorns and candelabra Cactus of Santiago province are almost as striking as the changes in Cape Colony.

Of all countries which I have visited this strict dependence of species upon climate is most difficult to realize in the British Islands. Once one has seen other floras, the facts are quite as clear in Britain as anywhere else, but the effects of climate are for the most part much less marked in Britain and indeed in Europe generally.

Perhaps it is for this reason that the power of adaptation possessed by all plants seems to be so little realized.

No theoretical difficulties such as those brought forward by WEISMANN can possibly upset the evidence of the plants themselves.

Nor am I alone in frankly admitting change of environment as the obvious originator of new species. The principle seems to me to be now either expressly or implicitly admitted in many of these splendid monographs published by the Berlin School and also in the works of other botanists. I need only refer to the works of HENSLOW, of VON WETTSTEIN* on seasonal dimorphism, of ADAMOVIC† on the Servian and Balkan floras, of SCHULZ on *Cardamine*, and of ENGLER‡ himself in his papers on *Luzula*, *Arabis*, and *Cerastium*.

It is exceedingly difficult for anyone who does not live in London to

* Von Wettstein, *Botan. Centralblatt*. Band 81, p. 15.

† Adamovic, *Engler's Botan. Jahrbuch*, 1889-1900 and 1905.

‡ Schulz, *Engler's Botan. Jahrbuch*, 1903.

§ Engler, *Botan. Jahrbuch*, Vol. 36, 1905.

keep at all in line with modern botanical literature,⁶ but these few authorities are amply sufficient to show that those who deny to plants the possibility of species changing in type when gradually exposed to utterly different conditions of life have a fairly difficult task before them.

But if one accepts the view that all these climatic factors, sunshine, moisture, wind and root water do act upon the delicate, complex structure of vegetable protoplasm and produce responses as inevitably as a new sugar will affect a yeast colony accustomed to some other medium, then it seems to me that the origin of species can be up to a certain point understood.

If one wishes to induce variation artificially, it would seem best to select the very best seed likely to produce the strongest and most vigorous seedlings. Then it might be worth while to treat these seedlings as badly as possible, exposing them to all sorts of hardships without quite killing them. Such treatment will in all probability induce some sort of change, which may manifest itself more clearly when the plants are suddenly changed into thoroughly congenial conditions.

All evil influences, whether poisons or injuries by wounds and mutilations, seem, if not too severe, to promote a greatly enhanced respiration.

Perhaps this increased respiration may upset the regular habit of the species, but the particular treatment entirely depends upon what special result is required.

ELECTRICITY IN RELATION TO HORTICULTURE.

By J. H. PRIESTLEY, B.Sc.

[Read August 30, 1910.]

INTRODUCTION.—This title might preface a very general article, but it is intended only to deal with two methods in which electricity has been used in recent years to increase and accelerate the growth and yield of plants, viz. the system of overhead electrical discharge, and the use of electric light in the greenhouse.

The writer recognizes that the future extension of these methods in horticultural practice will be strictly limited by the extent to which electrical power is readily available. But the whole tendency seems to be towards the increasing use of such a safe and easily manipulated source of power as electricity, and the consequent reduction in its cost will tend more and more to bring it into the purview of the larger grower and market gardener.

As a consequence, if a method can be devised for utilizing this electric power, when it reaches the garden or greenhouse, to stimulate the growth of plants, to accelerate their production, and to increase their yield, it is clear that such a method will become more generally valuable as years go on.

I am therefore inclined to think that the time for experiment in this subject is well upon us, and that it is desirable that the next few years should see a larger number of centres throughout the country testing these methods under all possible conditions.

The cost of such experiments is considerable and the testing of the overhead discharge system must be left with the larger grower and the Agricultural and Horticultural Experimental Station; but the experiments with electric light are of such a nature as to be within the powers of many growers who may have access to the necessary electrical supply. The two methods are really quite distinct, and will be dealt with in turn.

As this article may be expected to circulate amongst those who have the power of experimenting in this subject if they so desire, considerable attention will be paid to questions that arise in regard to large-scale experimental trials with these methods, and the writer will always be glad to supply any further information within his power to horticulturists who may be interested in the matter.

OVERHEAD ELECTRICAL DISCHARGE.

The general principle of the systems I have grouped together under this heading is to discharge electricity into the air above the plant, which will then find its way to the earth through the plant.

This is always occurring in a greater or less degree in nature,

Physicists have demonstrated that in the layers of air above the earth there is always present a definite pressure or potential of electricity, leaking continuously away to earth, and in so doing traversing the tissues of the plants which form a mantle of vegetation over the ground. In times of thunder weather this electric pressure may be so increased that, unable to leak away rapidly enough by ordinary means, the pressure may be released by an electric spark, the lightning flash, passing from cloud to earth.

The electric potential above the earth is usually positive in sign; but when the air above the plants is charged artificially it may be charged with positive or negative electricity. Since the experiments of LEMSTRÖM it has been customary to use positive electricity, as both this investigator and later workers have stated that with overhead positive charges the results are more marked, but LEMSTRÖM's experiments are the only systematic ones upon the point. In later experiments the air above the plant has been raised to a positive potential practically equivalent to that which obtains in nature just prior to a thunderstorm.

If then it is desired to charge the air above the plants with electricity, it is necessary to have an apparatus capable of generating the electricity, and a system of conductors above the area to be electrified that will enable the electricity to be discharged into the air above this piece of ground.

The apparatus for generating electricity may take various forms. In the earlier experiments some form of influence or friction machine was used, and for experiments on a comparatively small scale where it is not desired to expend much money upon the electrical apparatus, this method is still used. In my experiments at Bristol I have used a home-made machine, constructed for me by Mr. T. CLARKE, of Bishopston, Bristol, and it has proved quite satisfactory for my purpose, but for continuous running, unattended, this method is not to be compared with the Lodge-Newman method to be described later.

Such an influence or friction machine can be mounted upon ball-bearings and driven from a small motor. It needs to be housed in a *very dry* shed, and it is almost essential to have available some means of warming the machine.

My own machine is mounted within a case of glass and mahogany, the base of which is formed of a piece of corrugated iron. The lower side of this can be heated by means of a gas jet beneath, and it is possible to work this machine in all weathers and maintain an effective pressure upon the small system of wires connected with it. At times one spends many vexatious hours in persuading the machine to start, but when in good condition and running day after day, all that is usually necessary is to start up the motor, the machine then self-excites, and will run continuously for as long as required. The insulation of such a machine falls off with time, and it is necessary to have the glass plates revarnished.

One difficulty I have found, is that the products from the gas jet

used for heating purposes rapidly corrode the metal work of the machine. To obviate this I have now had a chimney inserted to lead off the heated air as it passes along the corrugated iron base. This will probably also increase the efficiency of the machine, in that it will prevent a rise in the general temperature of the shed in which the apparatus is housed. The machine is at its best when the temperature of the plates is somewhat above that of the air around.

For experiments upon a larger scale, or when expense is not the limiting factor, then the newer system of generating electricity which I have elsewhere alluded to as the "Lodge-Newman" system is much to be preferred. Though more expensive in initial outlay, this system would probably be found economical in all cases where continuous running over long periods is required, and where there is available some ordinary supply of direct current at any of the usual voltages.

Where such a current is not available, then the outlay is increased by the necessity of generating current by means of a motor and direct current dynamo. As a set-off to this consideration, as the apparatus will only require some five to ten amperes of current at the outside, there would probably be available from the dynamo a considerable amount of current that could be used for other purposes, e.g. to charge batteries, for electric lighting, etc.

The direct current is taken through a mercury "break" and the primary of a large induction coil. The result is, of course, high voltage electricity generated in the secondary of this coil in alternating surges of positive and negative electricity. But between the secondary and the outside circuit there intervene some of the valves invented by SIR OLIVER LODGE. These valves will only permit the electric charge to jump across them in *one* direction. They can therefore be arranged so as to permit only the positive surges of electricity to get across or only the negative. In this manner the outside network of wire may be charged continuously to a high voltage with either positive or negative electricity.

The actual voltage on this outside current can be tested at any time by seeing through what distance of air a spark will jump from a wire connected to this network to another wire connected to earth. In actual experiments the distance between the two conductors in this spark gap may vary between half an inch and an inch and a quarter—distances which indicate pressures running at their higher limit to over one hundred thousand volts.

The great advantage that this method of charging the overhead system of wires possesses, is that the induction coil produces so much greater *quantities* of electricity than the electrical friction or influence machines. As a consequence, though the leak from the system of wires outside may be considerable, yet the quantity of electricity passing from the coil may be sufficient to keep up the necessary high voltage upon the wires. In my experiments with the other method, it has often been my experience that the addition of a few discharge points to my overhead system has been sufficient to bring down the potential

of the whole system so considerably that effective discharge ceases to take place and the machine may even cease to excite.

The Lodge-Newman method requires the use of apparatus that is covered by patents, and inquiries as to installations must be directed to the Agricultural Electric Discharge Company. From conversation with MR. NEWMAN I am hopeful that this Company will turn its attention to the production of a small coil suitable for use with the valves, and which will considerably reduce the cost of an outfit capable of employment in small-scale experiments.

When by some method the necessary high tension current has been obtained, the next question is the production of the discharge over the plants selected; and as this presents distinct problems in the case of outdoor and indoor crops these two cases will be treated separately, the simpler case of outdoor crops being considered first.

OVERHEAD DISCHARGE ON OUTDOOR CROPS.

The great advantage that the Lodge-Newman system possesses here lies in the fact that the potential maintained being usually greater, the wires from which the discharge occurs can safely be raised higher above the crops, so that hoeing and other operations can be carried on amongst the growing plants without interfering with the overhead network.

The height of the wires is chiefly determined by the potential to which they are charged. For horticultural work they need probably never be taken to a greater height than 10 feet, and this height presents no difficulty with the Lodge-Newman apparatus. With an influence machine used to generate electricity they would have to be brought much nearer the ground.

At Evesham, in the experiments upon MR. RAYMOND BOMFORD'S farm at Bevington, the wires have been kept at a height of some sixteen feet and a satisfactory discharge still obtained.

This overhead system of wires has to be carefully insulated from all its supports so that the high potential given by the electrical apparatus may be maintained. If too much leak occurs down supporting posts, the potential of the overhead system will fall, and in this point lie some of the chief difficulties to be overcome in the experiment.

The network is raised on stout poles, crowned by insulators of a special pattern, but the charged wire is not permitted to touch the insulator, connexion being made through a considerable length of ebonite rod or other insulating material. This insulating material has in experiments up till now kept the charged wire four feet or so from the post, but MR. NEWMAN recommends that in future experiments this distance be increased, as discharge is still apt to take place from the charged wire across the air to the supporting pole, rather than direct to the earth.

The overhead network is usually supported by two main lines of poles to which are connected in the manner just described two strong thick wires; these are placed on either side of the area to be electrified. Between these two wires and across this area, therefore, are stretched

thin galvanized iron wires from which the discharge will take place. With the high potential given by the Lodge-Newman apparatus ample discharge will occur from a thin wire; with the influence machine it may be necessary to add short points projecting downwards from the wires.

The distance apart of these wires depends upon the height the network is raised from the ground; with a network ten feet high the wires should probably not be more than twelve feet apart.

The shed in which the high tension current is generated should not be far from the network so that little opportunity is given for leakage in the passage of the charged wire from the shed to the outside field.

The wire should leave the shed under the shelter of a pent roof so as to be protected as far as possible from rain, and it will preferably issue through a fairly large hole as few insulators are so satisfactory as air. Very good insulation is provided by passing the wire through a quartz tube and mounting this on the top of a porcelain insulator, itself mounted on the top of an ebonite rod or a glass rod that has been carefully paraffined when dry.

The wire that runs in this manner from the inside of the high tension shed to the overhead network should be quite short and be itself covered with some insulating material, e.g. gutta percha or indiarubber.

OVERHEAD DISCHARGE ON INDOOR CROPS.

Very little work has so far been done in the application of this method within greenhouses, but an experiment continued for some years at Bitton enables some suggestions to be made as to how this should be done.

The shape of the house will be an important factor, and the wider the house the easier the arrangement of the discharge wires will be. An important consideration is the position of the metal tubes used for heating, and of all other conductors such as the wires used to support plants against the side of the house, etc. In houses where the plants are always growing beneath or behind wires used to support them, the method cannot be applied with any hope of success.

With a narrow house it will probably be impossible to stretch more than two wires down the length of the house, while in a broad house it may be possible to arrange a grill-like network. In either case probably the easiest way to support the system of wires will be to suspend them by means of insulators and paraffined string from the sides of the house; the distance between a charged wire and the side of the house always being greater than the distance between the same wire and the plants which it is desired to electrify.

There should be some arrangement by which it is impossible to enter a house when the inside wires are charged without either discharging them or obtaining warning of the fact that the wires are "live." This may be managed when the doors open inwards by attaching one support to the door so that when the door opens the wire

network sags and sparks to the ground. If the door opens outward then this support may be attached to a handle outside the door, in such a manner that the door can be opened only by releasing the tension on it by letting the wire sag and discharge.

Some precaution of this sort is necessary so that people working in the houses may not get unnecessary shocks; with a large system of wires the shocks are as bad as those received from large Leyden jars, and an unpleasant addition to the other vicissitudes of a horticultural occupation.

My experience with the system inside a greenhouse leads to the conclusion that it will be far more efficacious in the case of crops grown in pots all over the floor of a large house, than in the case of plants such as vines and cucumbers which are grown climbing up the sides of the house. The latter plants are so insulated as they grow up behind their system of supporting wires that very little discharge can effectively reach them.

In the case where I have seen cucumbers electrified all effect seemed to be produced in the first month or so, during which time the leaves and shoots were still chiefly below these supporting wires and therefore under the influence of the discharge.

A great difficulty in the case of greenhouse electrification is the problem of getting the charged wires into the house. This should be done beneath a pent roof, but the insulation need not necessarily be quite so elaborate as suggested for the exit from the high tension shed.

At Bitton they entered through ebonite tubes packed into earthenware pipes, placed over the door and under a pent roof; the charged wire then dropped down upon the single insulated wire suspended down the centre of the greenhouse.

At Bitton there was no complete partition between one cucumber house and the next, it was therefore possible to take a loop of insulated wire from one house to the next, the leak not being too serious. These loops of wire were carried through glazed earthenware tubes half an inch to an inch in diameter, suspended from the partition wall above by paraffined string.

If this cannot be done then it will be necessary to lead a charged wire down the front of the series of houses which it is desired to electrify, and from this to take short lengths of wire down into each greenhouse through some such insulated aperture as previously described.

TESTING THE DISCHARGE.

In some such way as this it is possible to arrange to produce a discharge upon almost any crop, but if the experiment is to be of any value it is necessary to carefully test the discharge system when working, to see whether electricity is leaking away as desired on to the plants beneath the wires.

For this purpose a long insulated wire is held beneath the charged wires and just above the level of the crop that is being electrified. If

the discharge is effective this test wire should then accumulate a small charge from the electricity passing through the air.

The accumulation of this charge can be detected by touching the wire with a moistened finger or with the tongue and thus detecting the slight shock as the charge passes away through one's body to the earth. At night the discharge may be tested by placing against the test wire one terminal of a small vacuum tube, the other terminal being connected by a wire to earth. Through the vacuum tube a faint glow will occur as the charge passes away through it to earth.

For an experiment to be satisfactory, whether with the outdoor or indoor system it is essential that this test be made at times to see that an effective discharge is maintained. With the greenhouses at Bitton it was uncomfortable but necessary work.

MR. NEWMAN and I crawled through a considerable length of the houses, holding the test wire stretched between two ebonite rods, and thus it was possible to show that the discharge was effective except behind the hot water pipes and behind the wires put up to support the plants.

APPLICATION AND RESULTS.

Having now described the method it would seem desirable to go on to prescribe times for its application, etc., but unfortunately such rules cannot be laid down at present, the action of the current is so little understood. The following provisional hints are given in the light of what is at present known in the matter, and experiments are in progress.

In the first place it is certainly undesirable to apply the discharge in very dry weather, for by so doing crop yield is decreased; on the other hand, during rain the overhead wires leak too much to render discharge practicable.

The discharge then can be applied effectively only when the weather is fine and the soil contains sufficient moisture. Applied at any time when these conditions hold it seems probable that the yield of the crop would be *accelerated*, but it may be that it is only by application at certain times that this yield may not only be accelerated but also increased.

Unfortunately as to what those times may be very little is known. Some experiments suggest that early morning and evening would be the best times. Some useful experiments might be carried out by using one apparatus to electrify different networks for different periods within the twenty-four hours and comparing the results.

The results obtained in previous experiments are not referred to in any detail here—they have been given so fully elsewhere: good lists will be found in the *Journal of the Board of Agriculture*, vol. 17, p. 14, in the *Field* for September 24, 1910, and in my lecture before the Farmers' Club on April 3, 1911.

Probably the most striking result of previous experiments from the horticultural point of view is the almost constant occurrence of

acceleration as a result of electrification. Such acceleration may be largely responsible for the increased crop, because by gaining a week upon the weather the plant may mature its grain or fruit under more seasonable conditions. But there is no doubt that such acceleration would mean an earlier arrival of produce on the market for the grower, so that further experiments with this method are of the greatest importance for the horticulturist.

* * * * *

FORCING BY ELECTRIC LIGHT.

This is no new subject; in 1871 DR. SIEMENS was reading papers before the Royal Society upon the use of the electric arc for this purpose, and in later years the late MR. THWAITES carried out experiments in which travelling lamps were used.*

These earlier experiments also seem to have shown that the arc light, when not screened by glass, was too powerful for the plant, probably too rich in actinic rays, i.e. the rays at the violet end of the spectrum.

With this in view, when MISS E. C. DUDGEON, of Dumfries, asked my opinion about the use of the Cooper Hewitt mercury vapour lamp for this purpose, I suggested that the lamp would be rather harmful than otherwise because of the preponderance of actinic rays in its radiation. Fortunately MISS DUDGEON was not deterred from carrying out the experiment: the Cooper Hewitt lamp was tried, and the results are simply remarkable. Rapid germination and continued rapid growth resulted from the use of the lamp for a period of some two hours every evening after daylight had failed. MISS DUDGEON'S experiment is on too small a scale to enable crop yields to be given, but I give her table of germination results more fully than I have done elsewhere.

RESULTS RECORDED BY MISS DUDGEON BY DECEMBER 26, 1910.

Variety	Experimental House †	Control †
	Days taken to germinate	Days taken to germinate
French Beans	13	21 days
Syrian Beans	11	Not germinated yet, planted October 11
China Beans	9	" " "
Soya Beans	11	" " "
Carrot	11	26 days
Second sowing same week .	6	—
Cauliflower	6	26 days
Indian Corn	8	57 "
Lettuce	6	12 "
Maize	11	58 "
Peas, Laxton's	7	16 "
Maple Pea	6	16 "
Petersburg Peas	6	16 "
Oats	7	12 "
Barley	7	12 "
Wheat	8	16 "

* *Journ. R.H.S.* vol. xxxiii. (1908), pp. 401-416.

† Temperature of experimental and control houses about 55° by day and 40° to 43° at night, except when sunshine raises temperature.

General Remarks.

Germination of seeds from six to ten days earlier in experimental house.

Foreign Seeds, such as Chinese and Syrian beans and Indian maize, germinated in five or six days, and continued to grow considerably faster than those in control house; strong stalks and good foliage.

Chinese Beans (second sowing) germinated in five days (control twelve days) and have grown 2 feet 1 inch in nine weeks; strong healthy plants.

Indian Corn (second sowing) germinated in five days, now nine weeks old, height $5\frac{1}{2}$ inches, length of blade $8\frac{1}{2}$ inches. Control germinated in three weeks, height now $4\frac{1}{2}$ inches, length of blade $4\frac{1}{2}$ inches.

Cauliflowers and Carrots have responded best of English seeds; plants in experimental house sturdy and strong growth. Carrots in experimental house singled, those in control not yet large enough to single though four weeks older.

Mustard and Cress.—In both houses much the same.

Lettuces.—Rather weak and long growth.

Dwarf Vegetable Peas.—Germinated in experimental house in six days (second sowing); height of peas now, nine weeks old in experimental house, eleven inches. Germinated in control house in sixteen days, height now (eleven weeks old) nine inches.

Rose Tree which had flowered all summer and autumn under glass I pruned as bare as a vine the end of November, and placed in experimental house on December 7. It is now in leaf, with several buds and one rose in full bloom.

Carnation cutting taken in autumn put in experimental house January 24, made up to date (since January 24) 1 inch growth.

Pelargonium cuttings made strong growth, leaves large and of good colour.

Ivy-leaved Pelargonium cut down to about 4 inches from root the first week in December have made new shoots strong and healthy, some now 2 feet in length.

Strawberries.—Foliage thick, more so than in control house, those pots nearest the lamp showing blossom; no appearance of blossom in control house.

Fig.—Leaves in experimental house much larger, more numerous, and of stronger growth than in control house, but fruit not so healthy in appearance; the gardener attributes this to my neglect in watering sufficiently at commencement of showing bud, and which did not occur with plant in control house, he having pointed out the want of water before control tree showed any sign of bursting leaves or showing fruit. To ascertain whether this is correct have moved tree from control house into experimental house to see if figs still remain healthy and continue to swell.

Tomato seeds germinated in nine days in experimental house;

seedlings look strong and healthy; sown January 9; those in control house not germinated.

French Beans.—A very noticeable difference for the better in those in experimental house, they and tomatoes appear to require more heat in house without the lamp. N.B.—I have carefully watched the thermometer, and the mercury lamp does not raise the temperature.

These results are very striking and cannot be attributed to forcing heat. The lamp was four feet above the plants, and as these lamps are remarkably free from heat rays, the direct heating effect under these conditions would be practically absent. Thermometers were near the experimental pots and the control pots in the neighbouring greenhouses, and if anything the temperature near the controls is usually rather the higher.

But there are other ways of forcing plants. Has this method any advantage to commend it? Probably it has, because though the treated plants had given more rapid growth, there is no indication of over extension of tissues, of lanky unnatural growth. On the contrary the plants are, if anything, of a better appearance than the controls, of a healthy green and a sturdy habit, looking in no wise like the unhealthy product of over-forcing.

To what is this forcing to be attributed? Presumably to the extra supply of energy given to the plant in these two evening hours, and apparently the ultra-violet rays have been of no harm to the plant.

My own experiments, like those carried out by MACQUENNE and DEMOUSSEY in France, show that too much ultra-violet radiation can be harmful. Thus if plants are placed in the light of a mercury vapour lamp contained within a quartz tube instead of a glass one, the quartz permitting many more of the ultra-violet rays to pass, the plant soon shows the effect of the treatment.

Some plants, for instance, geraniums and *Tradescantia*, will wither in a day or two after only an hour's exposure to the rays, others are more resistant, and I have been able to grow mustard seedlings for a week or two under the light before they succumbed. These mustard plants were extraordinarily thick-set and sturdy and quite glabrous: living continuously under the light they had failed to produce a single hair.

This last result shows clearly how the action of the ultra-violet rays is restricted to the surface of the plant, a result to be expected because the rays are so rapidly absorbed by the epidermis. Probably the thicker the cuticle of the plant the more resistant the plant will be to these rays. But when the proportion of ultra-violet rays in the light has been cut down by the insertion of a clear glass screen, then it is possible to grow the plants in the light without injury and with accelerated growth. The conclusion seems to be that a certain proportion of the ultra-violet rays is not injurious to the plant, but possibly even beneficial, and that in the ordinary Cooper Hewitt mercury vapour lamp, with its luminous vapour enclosed in a glass tube,

we have a favourable percentage of these rays, and that in these or in the luminous rays present we have a forcing agent of no mean value.

These lamps are somewhat expensive, but they have been largely employed in factories and workshops. They should run with little attention, and are very easy to start up in the evening, and a trial with them might be well worth the while of a horticulturist who has available the necessary direct current at the normal voltages.

This is an impatient world, so that any factor which tends to accelerate production cannot be neglected by the grower, even though it tends to make life more strenuous than it was before.

With this in view I have attempted to give an account of two applications of electricity which may prove to be of service in accelerating crop production. At present, however, their appeal is rather to the grower with time and money for experimental work than to the man whose chief desire is a *certain* method of increasing his profits.

WEEDS AND WEED SEEDLINGS.*

By H. C. LONG, B.Sc. (Edin.)

[Read January 17, 1910.]

Oh! Life is too short for briars
 And thistles to grow in the way,
 Let us crowd the path with roses,—

* * * * *

ANON.

THE aim of the gardener is to "crowd the path with roses," to provide a plentiful supply of beautiful flowers and useful fruit and vegetables, and with this object in view he finds it necessary to eradicate the briars and thistles and other weeds that "grow in the way"—too often a by no means easy task. In order to ensure the destruction of weeds accurate knowledge of the principles underlying the growth of crops is essential, for wherever a particular weed is plentiful there is some reason for it.

Weeds are being more fully studied than formerly in almost all countries, and considerable attention is being given to the question of their eradication and prevention, and to the provision of a pure seed supply, and it is well that these matters should not be neglected in Great Britain.

From the horticultural point of view weeds are perhaps less troublesome than on the farm, for spaces are smaller, labour is more plentifully bestowed, and cultivation is more intense, but still they are troublesome, and just as garden plants need to be studied if they are to be successfully cultivated, so weeds need some study if they are to be successfully combated.

That weeds are abundant needs little showing perhaps, but it may be mentioned that in August 1909 the writer found twenty-nine species within a small portion of a field of standing wheat, and no fewer than seventeen of them were abundant, and nearly all among the worst weed pests of the farm.

Those wild plants, which are commonly denoted weeds, are not the only weeds, for every gardener knows that many cultivated species may easily become too numerous and cause trouble by appearing too freely where they are not wanted. Such flowers as Shirley poppies, larkspurs, Canterbury bells, and others may all be troublesome at times where they have been allowed to distribute seed, while we have unhappily experienced the weedy character of Jerusalem artichokes

* The writer is much indebted to Miss Bertha Reid for the preparation of the drawings of weed-seedlings. The remaining figures are reproduced from *Common Weeds of the Farm and Garden*, by permission of Messrs. Smith, Elder & Co.

accidentally buried in a bed on which seeds were sown! All such troublesome plants, cultivated or wild, are strictly "weeds," but we have confined our attention here to the wild Flora.

Weeds are *annual* (or *ephemeral*), *biennial*, or *perennial*, and we may take it that roughly the difficulty of eradicating a given weed varies according to the group to which it belongs—though not invariably so. Annuals are reproduced from year to year by seed, the plant living one season only, while some species (chickweed, groundsel) which give rise to several generations in a year are known as *ephemerals*; *biennials* become established from seed one year, and flower, seed, and die the next; and *perennials* survive for a number of years varying with the species, in general producing seed each year, and often extending also by means of creeping rootstocks.

HOW WEEDS ARE SPREAD.

Weeds are distributed by many agencies. Annuals and biennials depend for their distribution on seed, and these classes produce enormous

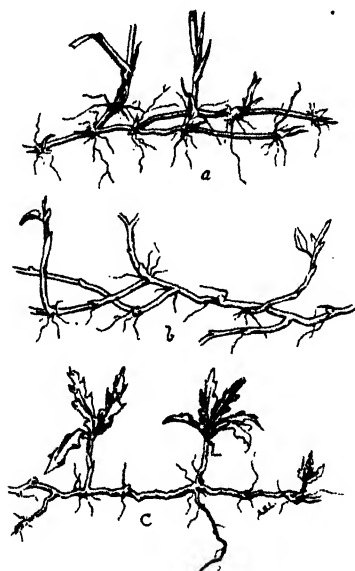


FIG. 1.

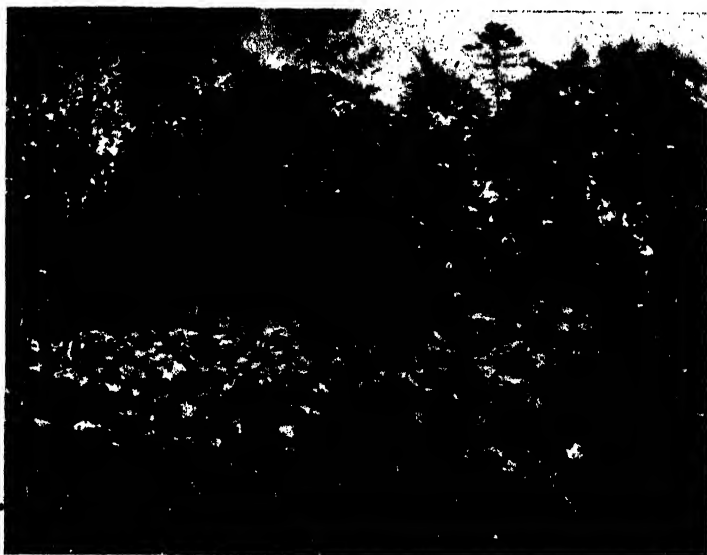
a, Rootstock of Couch (*Triticum repens* L.); *b*, Rootstock of Great Bindweed (*Convolvulus sepium* L.); *c*, Roots of Creeping Thistle (*Cnicus arvensis* Hoffm.). All $\times \frac{1}{2}$.

quantities of seed, often many thousands on a single plant. The perennials are not so dependent on seed, and produce less, but such plants as couch, creeping thistle, bindweed, and coltsfoot have extensively creeping rootstocks by which they insidiously extend beneath the soil, while broken pieces of these rootstocks are often carried on implements and dropped where they may start a new centre of infestation. (Fig. 1.)

As an indication of the quantities of seeds produced by some weeds, it may be pointed out that a single plant of—

Charlock	may produce	1,000—	4,000 seeds
Shepherd's Purse	„	4,500	„
Poppy	„	50,000	„
Chickweed	„	500	„
Cleavers	„	1,000	„
Groundsel	„	300—	20,000 „
Perennial Sow Thistle	„	3,000—	19,000 „
Coltsfoot	„	5,000	„
Dandelion	„	3,000—	5,000 „
Scentless Mayweed	„	34,000—	310,000 „
Field Bindweed	„	600	„
Narrow-leaved Plantain	„	2,500—	15,000 „
Burdock	„	24,000	„

Another point should be briefly noted, viz., that many seeds possess great vitality, and may lie dormant in the soil until conditions are



[Photo: H. C. Long.]

FIG. 2.—A WEED-DISTRIBUTING AREA : SHOWING AN ABUNDANCE OF THISTLES AND OTHER WEEDS IN FLOWER, AND A BIG CROP OF LEAVES OF COLTSFOOT.

(Photographed about June on a suburban building plot.)

favourable for germination, when the plants suddenly appear and cause trouble. Professor PETER has shown that Charlock may lie dormant in the soil for forty years, and it is well known that the seeds of many other plants may survive and germinate after several years, while others even pass unharmed through the digestive tract of live stock and birds.

The numbers of seeds which may be found in the soil of a garden or field varies considerably. In his own garden the writer found in a square yard of soil (in May 1909) no fewer than 1050 seedlings (or

over five millions to the acre). Of these seedlings 654 were buttercups, 107 annual meadow grass, sixty dock, twenty-six goosefoot, twenty-five groundsel, fifteen shepherd's purse, fourteen annual sow thistle, ten chickweed, eight *Persicaria*, five charlock, four creeping thistle, one plantain, one clover, and 120 unidentified. In Korsmo's experiments, however, vast numbers were found to a depth of 9·8 inches in the soil, *e.g.*:—

Fallow field—8680 to the sq. yard, or 41 millions to the acre.

Spring grain field (4 years)—28,210 to the sq. yard, or 136½ millions to the acre.

These figures are a sufficient indication of the enormous numbers of seeds which must be produced by wild plants, and emphasize the need for care in preventing seeding.

All sorts of vacant and waste plots of land serve to act as weed-distributing areas. Figure 2 shows a vacant building plot near Surbiton, and from it a variety of pestilent weeds were distributing their seeds into adjacent gardens.

USES OF WEEDS.

Of the uses of weeds little need be said, but they may act as green manure when dug in, or when hoed and left to die on the surface of the soil; they indirectly promote good tillage by enforcing various types of cultivation, especially hoeing; they may prevent the washing out of nitrates when the soil is unoccupied by a crop; many of our finest flowers and vegetables have been derived from wild forms, and probably many others will be; many possess various uses—rushes and sedges for mats and baskets, watercress as a salad, dandelion for “wine” and “tea” and as a salad; groundsel for cage birds; and others possess varied qualities when employed in the preparation of drugs.

Weeds also often act as “Indicator” plants, giving some idea as to the type of soil on which they grow. For instance:—

Sandy Soils.

Spurrey.
Corn Blue-bottle.
Corn Marigold.
Sheep Sorrel.
Poppy.
Field Bindweed.

Calcareous Soils.

Field Madder.
Scabious sp.
Viper's Bugloss.
Burnet.
Chicory.
Fumitory.

Heavy Soils.

Corn Buttercup.
Coltsfoot.
Horsetail.
Dyer's Green weed.
Rest Harrow.
Perennial Sow Thistle.

Damp Soils.

Rushes and Sedges.
Silverweed.
Lady's Smock.
Horsetail.
Butter-Bur.
Meadow Sweet.

Poor Soils.

Spurrey.
 Quaking Grass.
 Rest Harrow.
 Ox-eye Daisy.
 Dyer's Green-weed.
 Sheep Sorrel.

Good Loamy Soils.

Groundsel.
 Goosefoot or Fat Hen.
 Chickweed.
 Sow Thistle.
 Cleavers.
 Buttercups.

DAMAGE DONE BY WEEDS.

It has from immemorial times been recognized that "weeds" are harmful, even from the time of the Garden of Eden; and Shakespeare says:—

I will go root away
 The noisome weeds, that without profit suck
 The soil's fertility from wholesome flowers.

Rich. II. Act iii. sc. 4.

One of the most obvious ways in which they do harm is by robbing cultivated crops of space, food, and water, and of light and air, all of which are necessary for the proper growth of the crop. The facts as to space, light, and air will be obvious to all, for two plants cannot occupy the same space, and the weed may cut off the sun's light, while a crop crowded with weeds is restricted in the free circulation of air necessary for gaseous interchange. Weeds require food in the same way as cultivated crops, and STUTZER and SEIDLER's analysis of certain weeds show that the average dry matter in the annual sow thistle, cornflower, *Persicaria*, spurrey, wild radish, and yarrow contained 2.38 per cent. of nitrogen, 0.93 of phosphoric acid, 3.08 of potash and 2.86 of lime, *Persicaria* being especially rich in all these constituents. Weeds also transpire, or pump water up from the soil and pass it into the atmosphere by their leaves—and this must be to the detriment of the cultivated crop, especially on soils which dry out quickly and in hot summer weather.

Cultivation is much hindered by weeds, and "singling" is often particularly difficult owing to their presence, though, as we have seen, weeds render tillage absolutely necessary if a crop is to be obtained.

Many weeds are poisonous; others are parasitic on cultivated crops; some stop up drains; the value of seeds is often much reduced by the presence of weed seeds; and weeds like cleavers, bindweeds and wild vetches drag down and choke out crops, and may do great harm among bush fruit trees (we have seen raspberry canes and hedges almost smothered by the larger bindweed, *Convolvulus sepium*).

Another point of importance is that weeds act as host plants for injurious insects and fungi, sustaining them until suitable cultivated plants are plentiful. For example, the following insects and fungi attacking garden crops find quarters on the weeds named:—

<i>Insects or Fungi.</i>	<i>Weed "Hosts."</i>
Turnip "fly" or flea beetle	} Charlock and other crucifers.
Turnip Gall Weevil . . .	
Celery Fly	Thistles.
Bean Aphis	Goosefoot, Docks.
Finger-and-toe of turnips, etc. .	Charlock and other Crucifers.
Sclerotium disease	Many weeds.
White Rust of Cabbages, etc. .	Shepherd's Purse and other Crucifers.
Gooseberry-leaf Cluster-cups .	Sedges.

Money losses due to weeds are often very considerable, and have been shown by various experiments to be even as much as 67 per cent. of the crop when weeding has not been practised. At Reading College Farm the difference in yield between "no weeding" and keeping clean by hand after the mangold crop was singled was as that between 100 and 240, the actual yields being 16½ tons and 39 tons respectively. KORSMO found a weedy plot of potatoes to yield 4 tons 10 cwt. from an acre, while a clean plot yielded 8 tons 15 cwt. A clean plot of barley yielded 18 cwt. of grain, and a weedy plot only 6'6 cwt. In a German trial two plots of oats infested with charlock yielded 45 bushels and 24'8 bushels respectively, while plots kept free from charlock yielded 67 and 76'5 bushels respectively.

PREVENTIVE AND REMEDIAL MEASURES.

In an endeavour to combat weeds, irrespective of their class or kind, a number of preventive and remedial measures should always be adopted.

(1) Thorough cultivation of the soil by spade and fork, and the free use of the hoe, will go far to keep down weeds.

(2) In all cases and at all times of the year a strenuous endeavour must be made to prevent weeds from seeding—and if weeds are faithfully attacked in their seedling stages this plan will be successful.

(3) Perennial weeds need repeated cutting down, and such a step will gradually weaken and exhaust them, for they use up their reserves of food in a continued endeavour to produce fresh foliage, flowers and seed. Repeated cutting off will exhaust and destroy weeds like the creeping thistle, coltsfoot, and other plants, but the cutting must be persistent and thorough over perhaps two or three years.

(4) Pure seed must always be employed, and a guarantee as to purity and germinating capacity should be obtained when seeds are purchased.

(5) Surface cultivation in spring, to produce a fine tilth and induce weed seeds to germinate, is an excellent plan, for the seedlings can then easily be destroyed by hoeing. The operation should be repeated as often as circumstances will allow.

(6) Heavy crops tend to keep down weeds, and this fact has led to the growth of such crops as vetches, lucerne, maize, rye, and buckwheat, all of which by their "crowding" action help to choke out weeds.

(7) Where weeds are particularly plentiful, the ~~rot~~ crops should be increased in the rotation, as the increased tillage and thorough hoeing they receive are of immense advantage in suppressing weeds.

(8) Among implements and tools which are particularly useful against weeds may be mentioned the various types of thistle and bracken cutter, the poppy killer for surface tillage, American and other weeders, bagging-hook, spuds, various types of hoes, mattock, daisy grubs and docking irons, and the "Buco" hand cultivator, which is employed in the West Indies as hoe, fork or rake.

(9) Hand-pulling; brushing of hedges, ditches and waste areas; and collection of weeds throughout a district by co-operation, are all sound methods. Dr. EWART (Government Botanist, Victoria) mentions a case in which 12,000 plants of ragwort were collected by school children in four days, the number quickly rising to 20,000.

(10) Draining may be necessary to eradicate some weeds, *e.g.* sedges, rushes, horsetails, mosses; some weeds, *e.g.* ragwort, knapweed and ox-eye daisy, may be reduced by depasturing with sheep; small patches of perennial weeds like creeping buttercups, bindweeds, coltsfoot, may be covered with strong tarred paper pegged firmly to the ground, the exclusion of light destroying vegetation beneath; "lawn sands" may have an almost marvellous effect in suppressing daisies and similar weeds on lawns, but they must be carefully employed; injecting poisonous materials into weeds like dandelions will kill them; the use of lime is effective against some weeds, *e.g.* spurrey, sheep sorrel, corn marigold, bracken, mosses; a pinch of salt or sulphate of ammonia on daisies, plantains and the cut tops of dandelions and docks is likely to destroy them.

(11) Spraying is effective in destroying some weeds. For example, charlock, rutch, *Lersicaria* and spurrey may be destroyed by a solution of copper sulphate; and quite a number of weeds are partially destroyed—seeding being prevented—by spraying with a solution of copper sulphate or iron sulphate.

The effect of a solution of copper sulphate on dandelions has been shown by Mr. H. L. BOLLEY, North Dakota Agricultural Experiment Station, who says that he "can safely vouch for the statement that spraying, when properly undertaken, is a much cheaper means of disposing of this pest in lawns than any other mode now in use, and that the grass need in no way be injured."

IDENTIFICATION OF SEEDLINGS.

In order to combat a weed successfully it is necessary to know whether it is an annual, biennial or perennial, and preferably something more of its life-history. Further, it is useful to be able to identify it before it reaches the mature stage, though we may say that all seedlings should be destroyed. Yet for future years it is well to know what weeds are when they appear as seedling plants. Now seedlings are as different among themselves as are flowering plants, and they differ not only by natural orders but by

genera in the same order, and by species in the same genus. The cotyledons differ, the first leaves differ, the general appearance of the growing seedlings differs according to species. Some cotyledons are linear and undivided, while others are linear and forked; some are spatulate, some roundish, some oval, some heart-shaped; some are entire but others lobed or even divided, forked or trifid; in some seedlings the cotyledons are unequal, or the lobes on the same cotyledon are unequal; the cotyledons may be sessile or stalked; the stalks may be fine, or stout and broad; and the cotyledons themselves may be thin, or thick and fleshy.

Similarly, when the true leaves come to be considered it is found that they also differ exceedingly according to species. It is not proposed to discuss the question of seedlings more fully here, but in dealing below with a few of the commoner weeds the external characteristics of the seedlings and the differences between them will be noted.

SOME COMMON GARDEN WEEDS. •

Space forbids a complete review of all weeds, but returns obtained from a number of practical agriculturists in England, Scotland, and Wales show that the worst weeds of arable land are, on the whole, the following:—Couch or twitch, charlock, runc, docks, thistles, colts-foot, chickweed, bindweeds, spurrey, poppy, corn buttercup, wild oat, knotweed, fat hen, redshank or *Persicaria* most prevalent in the order named, followed by a number of other weeds, among which are included groundsel, annual meadow-grass, nettles, cleavers, horsetail and Shepherd's Purse.

In the same way it was ascertained that the worst weeds of grass land appear to be thistles, buttercups, Yorkshire fog and creeping soft-grass, docks, daisy, plantain, soft brome grass, yellow rattle, sorrels, dandelion, *Agrostis* sp., knapweed, rushes, nettles, moss, sedges and self-heal.

Of these weeds it is proposed to refer specifically to the following:—

Creeping Buttercup	(<i>Ranunculus repens</i>)
Charlock	(<i>Sinapis arvensis</i>)
Shepherd's Purse	(<i>Capsella Bursa-Pastoris</i>)
Spurrey •	(<i>Spergula arvensis</i>)
Cleavers	(<i>Galium Aparine</i>)
Groundsel	(<i>Senecio vulgaris</i>)
Nipplewort	(<i>Lapsana communis</i>)
Burdock	(<i>Arctium Lappa</i>)
Dandelion	(<i>Taraxacum officinale</i>)
Scarlet Pimpernel	(<i>Anagallis arvensis</i>)
<i>Persicaria</i>	(<i>Polygonum Persicaria</i>)
Knotweed	(<i>Polygonum Aviculare</i>)
Black Bindweed	(<i>Polygonum Convolvulus</i>)
Docks	(<i>Rumex</i> sp.)
Couch Grass	(<i>Triticum repens</i>)

The Creeping Buttercup (fig. 3) is one of the most troublesome perennial weeds of the garden, quickly covering the soil if allowed in a network of runners. It grows rapidly from seed, and in great numbers, while plants turned under quickly push their way through the soil unless deeply buried. The weed may be destroyed if deeply trenched in, while plants which have been hoed out should be raked off the beds and burnt. Hoeing should be regular and thorough in hot weather, when seedlings may be destroyed in thousands.

The seedlings (fig. 4) have rather small, broadly oval or rotund-oval,

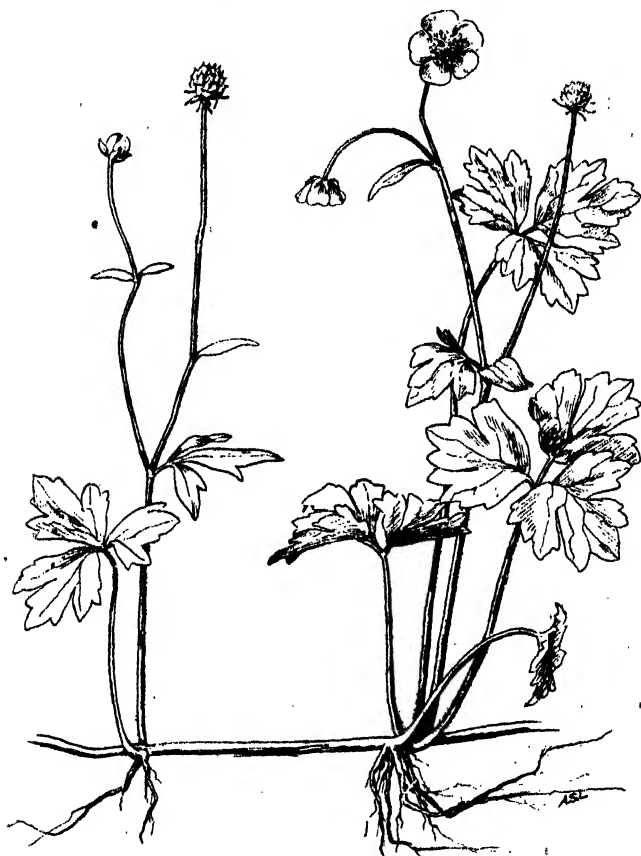


FIG. 3.—CREEPING BUTTERCUP (*RANUNCULUS REPENS* L.), $\times \frac{1}{2}$.

smooth cotyledons ($\frac{1}{4}$ inch long by $\frac{3}{8}$ inch broad) with slightly channelled petiole and a well-marked mid-rib. The young root quickly becomes duplicated, and is soon long, strong, and multiple, and as the plant grows runners are put out, these rooting at the nodes as the plant matures. The first leaves which appear after the cotyledons are three-lobed, and thereafter the lobes are indented, toothed or crenate. With further growth of the plant the leaves become divided into three stalked segments which are themselves lobed and toothed.

Charlock is an annual cruciferous weed and different from the fore-

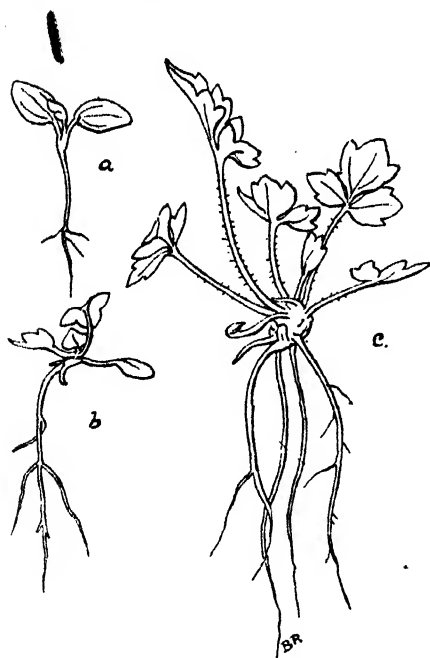


FIG. 4.—SEEDLING OF CREEPING BUTTERCUP (*RANUNCULUS REPENS* L.).
a. cotyledon stage; b, first-leaf stage; c, more advanced stage. Natural size.



FIG. 5.—CHARLOCK (*SINAPIS ARVENSIS* L.), $\times \frac{1}{3}$.

going species in every way. It is perhaps the most widely-distributed pest of arable land in this country, and is by many considered the worst weed of the farm (fig. 5). Seeds are produced in abundance and possess great vitality. Growth is very rapid, and, as every farmer knows too well, the fields yellow only too quickly when the pest is not properly combated. On the farm spraying with a solution of copper sulphate when the seedlings are not over three inches in height kills the weeds; but surface cultivation and thorough tillage and hoeing of root crops are also necessary. In the garden regular hoeing will keep it down.

The cotyledons (fig. 6) are heart-shaped, smooth, and dark green, and finally attain 2-5th inch in diameter (they grow somewhat after the first true leaves appear). The petioles of the cotyledons also grow, being at first short, and later about 4-5th inch long.

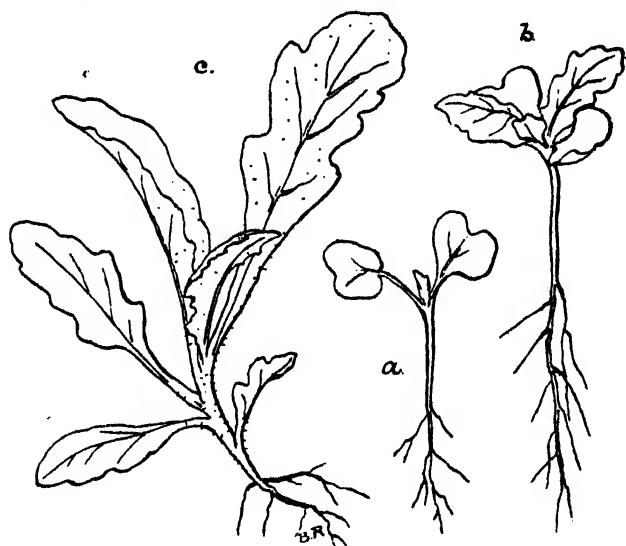


FIG. 6.—SEEDLINGS OF CHARLOCK (*SINAPIS ARVENSIS* L.).
a, cotyledon stage; b, first-leaf stage; c, advanced stage.

The first true leaves are about twice as long as broad, dark green in colour, rather harsh and rough, while in shape they are spatulate with irregular margins. (In turnips the first true leaves are smooth, lighter green, and nearly equal in length and breadth, or irregularly roundish.)

As the plant grows the root becomes well-developed and fibrous, with a stout central rootstock. The leaves grow larger, and are ovate or lyrate and toothed; the whole plant is rough, with hairy stem, and when crushed in the hand stains a dirty green. The cruciform yellow flowers give rise to longish two-valved pods.

Shepherd's Purse is another annual cruciferous weed, the flowers being small and white, and giving rise to nearly heart-shaped, laterally compressed pods (fig. 7). This weed is frequently very troublesome in

gardens, for seeds are freely produced; the plant flowers at almost any time of year—certainly from March to December—and the rosette of leaves at the base of the stem covers a considerable space. It must be combated by regular hoeing. It is an especial host of the white rust, *Cystopus candidus*. Shepherd's Purse attains perhaps 18 inches in height.

The cotyledons (fig. 8) are smooth, small, oval, or nearly spatulate, and shortly stalked. The first few true leaves are coarsely hairy on

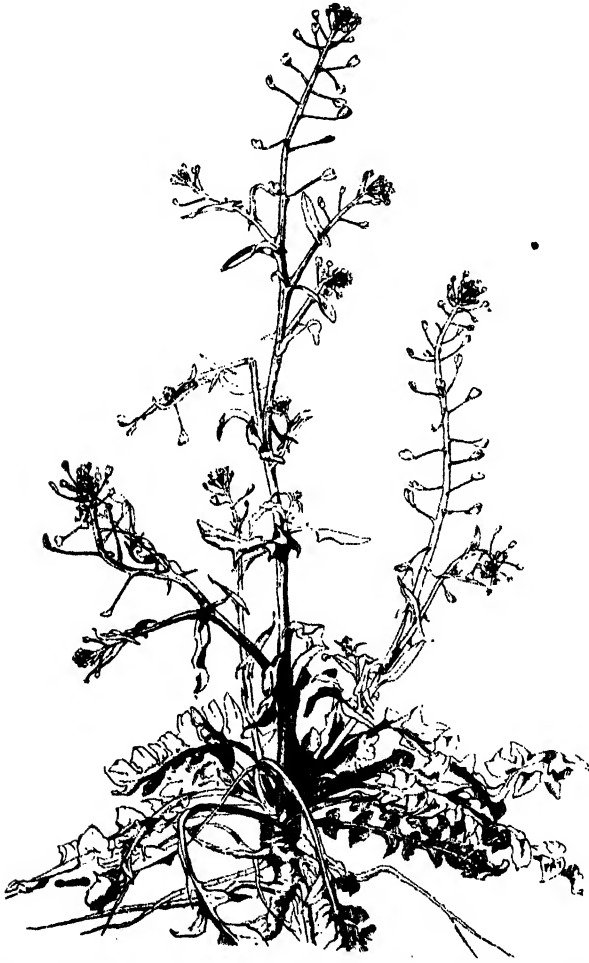


FIG. 7.—SHEPHERD'S PURSE (*CAPELLA BURSA-PASTORIS* DC.), $\times \frac{1}{2}$.

both surfaces and somewhat resemble the cotyledons in appearance; the young seedling of a few days old is quite tufty, the rosette form being assumed as the plant grows and the flowering-stem is sent up. The leaves at the base are long and more or less pinnatifid, while the few on the stem are small, entire and auricled. As the young plant grows the root becomes long, tapering and branched.

Spurrey (fig. 9) is certainly one of the most troublesome annual

weeds of arable land on light, sandy soils. It produces an abundance of seed and often invades corn and root crops, and may smother out crops sown in spring and summer. In garden cultivation thorough hoeing must be practised to keep it down, and strenuous efforts must be made to prevent seeding. Its presence is considered to be a sign of the absence of lime, and hence lime should be employed. Spurrey may be destroyed by spraying with 50 gallons to the acre of a 5 per cent. solution of copper sulphate. Feeding off with sheep is also useful, and it may be remarked that Spurrey is grown as a fodder crop on the Continent.

The cotyledons are long (about $\frac{1}{2}$ inch) and narrow (almost cylindrical), entire, fleshy and smooth, and the true leaves are small and fine, awl-shaped with a slight groove below, and $\frac{1}{2}$ to $1\frac{1}{2}$ inch long (fig. 10). The leaves of the young seedling at first give it a tufted appearance, but later are arranged in whorls around the thickened joints



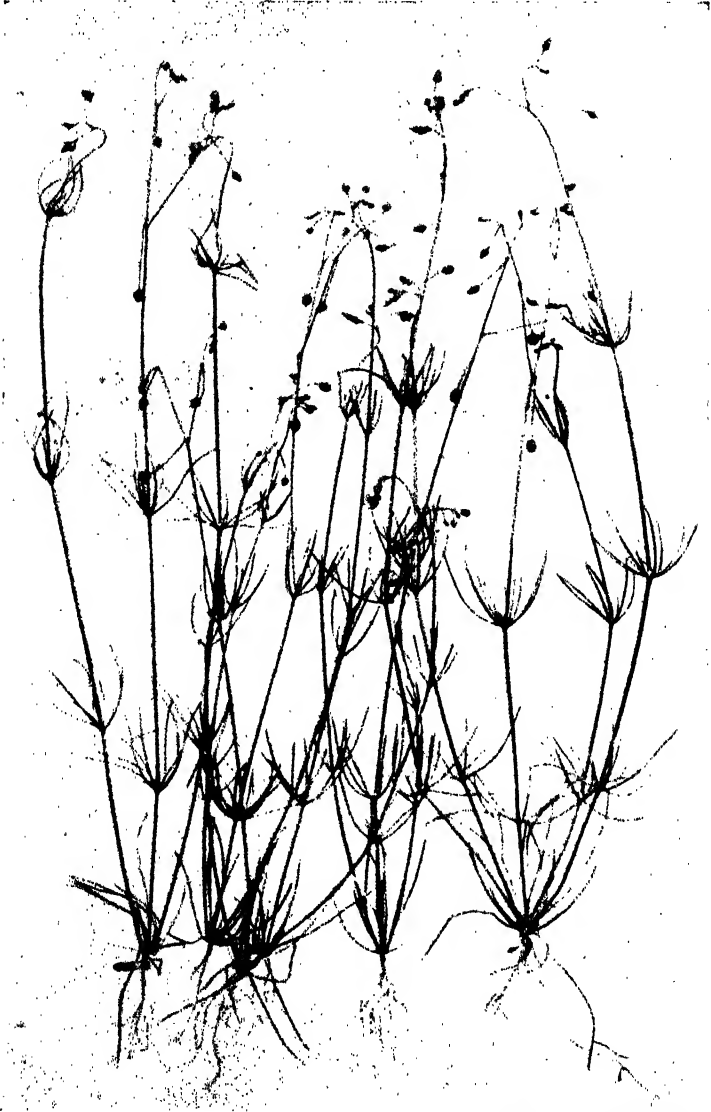
FIG. 8.—SEEDLING OF SHEPHERD'S PURSE (*CAPELLA BURSA-PASTORIS* L.).
a, early stage; b, second stage; c, third stage. Natural size.

of the stem, which is long and slender. The flowers appear from June to August, are white, $\frac{1}{4}$ inch in diameter, and in loose terminal clusters. The seed capsules are nearly globular.

Cleavers is a well-known straggling annual herb—slender, often called goose-grass, hariff, cliders, grip-grass, and similar expressive names. It attains a considerable height by climbing amongst other and stronger plants, and for this reason is often a great trouble. It is especially troublesome among cereals and certain garden crops. Thorough surface cultivation and hoeing throughout spring and summer are necessary to eradicate this weed.

The cotyledons (fig. 11) are rather large ($\frac{1}{3}$ in. long) and broadly oval, smoothed, notched or indented at the end, and shortly stalked. The first true leaves appear in whorls of four to six, and thereafter of six to eight. They are narrow and lanceolate, $\frac{1}{2}$ to 2 inches long, and very rough, as indeed is the stem, which has numerous small inverted

hooks by which the plant climbs. The seedling of two or three inches in height strikingly resembles the older plant, but is not branched. The stems of cleavers are four-angled; the flowers appear from July onward, are small, white, and in small clusters; the fruits are two-



[Photo J. C. Varty-Smith.]

FIG. 9.—SPURREY (*SPERGULA ARVENSIS* L.).

lobed, roundish, and rather large, purplish, and very rough owing to hooks which serve to distribute the weed, as the fruits become attached to animals and man and are later rubbed off.

Groundsel is an ephemeral composite weed which gives rise to

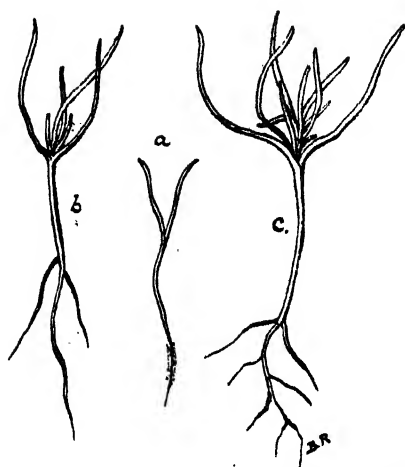


FIG. 10.—SEEDLINGS OF SPURREY (*SPARGULA ARVENSIS* L.).
a, cotyledon stage; b, second stage; c, third stage. Natural size.



FIG. 11.—SEEDLINGS OF CLEAVERS (*GALIUM APARINE* L.).
a, cotyledon stage; b, second stage; c, third stage. Natural size.

several generations in the year, flowering and seeding taking place nearly all the year round. It is especially prolific on good land, and often occurs in almost incredible quantity. The small drooping heads of



FIG. 12.—SEEDLINGS OF GROUNDSEL (*SENECIO VULGARIS* L.).

a, cotyledon stage; b, first-leaf stage; c, later stage. Natural size.

yellow flowers produce ribbed fruits attached to short pappus hairs which give the seeding heads the appearance of silky silvery bullets. The soft light pappus enables the fruits to be borne away on the breeze.



FIG. 13.—NIPPLEWORT (*LAPSANA COMMUNIS* L.), \times about $\frac{1}{2}$.

1, floret; and 2, achene, \times about 2.

This weed must be combated by repeated and thorough hoeing through almost the whole year.

The cotyledons (fig. 12) are small ($\frac{1}{4}$ in. long), somewhat longish-

oval or oblong-spathulate, stalked, and smooth; the first true leaves are entire, narrowly or broadly oval, and notched. As the seedling grows the leaves become more deeply notched, until they are irregularly coarsely toothed and pinnatifid.

Nipplewort (fig. 13) is another composite annual weed which sometimes occurs plentifully in gardens, especially, it appears, on loamy and clayey soils, attaining from one to four feet in height. The heads of yellow florets are in loose clusters on slender stalks. Thorough hoeing will keep this weed within bounds.

The cotyledons are broadly oval ($\frac{1}{4}$ in. long), and have rather long stalks (fig. 14). The first true leaves are inclined to be irregularly round or roundish-oval, and contract into the petiole. In the mature plant the lower leaves are lyrate, membranous, and contracted into the petiole, while the terminal lobe is very large, with waved margin;



FIG. 14.—SEEDLINGS OF NIPPLEWORT (*LAPSA NA COMMUNIS* L.).
a, b, c, progressive stages of seedlings. Natural size.

the upper leaves are scattered, small, entire or toothed, and much longer than broad.

Burdock is yet another composite weed, this time an erect branched biennial of grass land (fig. 15). The seedling become established in one year; and in the succeeding season develops rapidly into tall bushy plants, with large deep-seated roots; large, stalked, nearly heart-shaped pointed leaves, very cottony beneath; small purple flowers in globose heads one inch in diameter and clothed with stiff spiny hooked bracts, which aid in the distribution of the weed. (The name *Arctium* is from the Greek *arktos*, a bear, denoting the rough heads or "burs"). It may be mentioned that a year or two ago an advertisement in the form of a paper butterfly, each copy bearing a "bur" of the burdock, was being widely distributed, and in one of the Australian Colonies the Department of

Agriculture requested its withdrawal. This plant must be combated by the spudding of the seedlings in the first year, and the cutting down of growing plants of the second year to prevent seedings, especial



[Photo: J. C. Varty-Smith.]

FIG. 15.—BURDOCK (*ARCTIUM LAPPA* L.).

attention being paid to the sides of hedges, ditches, and waste places.

The seedlings of the Burdock have rather large longish-spathulate cotyledons (1-2 in. long), with well-defined mid-rib, the cotyledons

standing somewhat erect at first (fig. 16). The seedlings sometimes occur in dense clusters. Many seedlings may be found near an old plant. The true leaves are stalked, oval, and slightly pointed, quickly assuming the inversely heart-shaped character of the mature leaves.

The *Dandelion* is a final example of a composite weed. It is a perennial and is most troublesome in grass land. The rootstock is large and deep-seated; the leaves are oblong-ovate or spatulate, with toothed lobes, and lie almost flat on the ground in a rosette, so damaging and smothering the herbage; and the heads of yellow flowers on long smooth stalks bear many fruits with a pappus attachment to ensure distribution by the wind. We have a record of



FIG. 16.—SEEDLING OF BURDOCK (*ARCTIUM LAPPA* L.).

a, cotyledon stage; *b*, showing first leaf; *c*, later stage. Natural size.

one plant on which were 27 flowering heads, one of which bore 200 fruits—or 5400 on the plant. To reduce dandelions thorough manuring is necessary to encourage a better type of herbage; and spudding might be practised were it not so tedious and expensive. BOLLEY has already been quoted as to the effect of spraying with copper sulphate. A 5 per cent. solution of copper sulphate (160 gallons per acre), or a 15 per cent. solution of iron sulphate, appears to destroy the leaves and flowering stems and prevent seeding. The seedlings bear oval, elongate oval or nearly spatulate cotyledons.

The *Scarlet Pimpernel* belongs to the order *Primulaceae*. It occurs in arable fields and gardens, the small bright scarlet flowers opening in fine dry weather and closing when dull and wet, so giving rise to the name “poor man’s weather glass.” It is a small branched weed,

almost or quite prostrate. It is an annual, and the ordinary tillage of cultivation is usually sufficient to keep it down.

The seedlings (fig. 17) somewhat resemble those of chickweed. The cotyledons are oval or oval-lanceolate ($\frac{1}{8}$ – $\frac{1}{4}$ in. long), smooth, entire, and stalked, the stalks being at first erect and the blades curved outward. They are slightly fleshy, rather dark green in colour, and dotted beneath. The first true leaves resemble those of the mature plant, in which they are nearly oval, small, and sessile, and spotted beneath. The flowers grow from the leaf axils on long slender stalks. The stem is square, and branched from the base. The seed capsule somewhat resembles a small smooth pea.

Persicaria is a weed of the family *Polygonaceae*, which includes Knotweed, Black Bindweed and Docks. This weed is often very plentiful indeed, especially on good soils which are fairly moist. It is a freely-seeding annual, and vigorous, repeated tillage and hoeing are

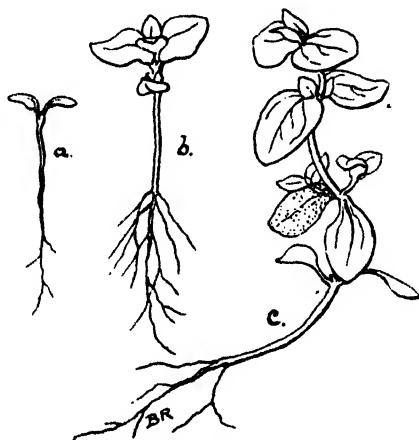


FIG. 17.—SEEDLINGS OF SCARLET PIMPERNEL (*ANAGALLIS ARVENSIS* L.).
a, cotyledon stage; b, second stage; c, third stage, branching. Natural size.

necessary to suppress it. It is rich in nitrogen, phosphoric acid, potash, and lime, and is considered a nutritious fodder for horses and cattle.

The cotyledons (fig. 18) are longish-oval in shape, shortly petioled, smooth, and medium green in colour, the portion of the stem immediately above the ground being tinged reddish. The first true leaves are elongate-oval to nearly lanceolate, and as the seedling grows the later leaves gradually assume a lanceolate character. The growing seedling soon branches, and thereafter growth is rapid. The leaves of the mature plant are lanceolate, almost sessile, and often bear a black blotch in the centre. The stems are branched, smooth and shiny, with much-swollen nodes, and a deep tinge of red above—hence the weed is commonly named Redshank. The flowers are very small, white or reddish, and borne in dense clusters or spikes $\frac{1}{2}$ to $1\frac{1}{2}$ inch long.

Knotweed is also an annual, but is much branched from the base, very slender and prostrate (fig. 19). It is often a serious pest, occurring

on most soils, especially those of a light sandy character. Tillage operations, with surface cultivation and thorough hoeing, must be faithfully practised if it is to be suppressed.

In the seedling stage (fig. 20) it has a pair of very narrow slender linear cotyledons (about $\frac{1}{2}$ in. in length), which are almost characteristic of the mature plant, for though the true leaves are progressively broader than the cotyledons, they are quite small, elongate oval or narrowly-lanceolate, entire, and very shortly stalked, with chaffy silvery stipules at their base. The flowers are minute and variable in colour—white, greenish, pink or crimson—and clustered in the axils of the leaves almost the whole length of the somewhat reddish slender stems.

Black Bindweed (fig. 19) is an annual of the same family but of quite a different type, for it is a twiner, with rather large heart- or arrow-shaped leaves and slender angular stems. It is a most mischievous weed,



FIG. 18.—SEEDLINGS OF PERSICARIA OR REDSHANK (*Polygonum persicaria* L.). *a*, showing cotyledons and first leaves; *b*, more advanced stage. Natural size.

resembling Field Convolvulus (*Convolvulus arvensis*) in the damage it does, twining itself round the cultivated crop, dragging it down, and in general choking it. It may be combated by ensuring pure seeds; by surface cultivation to encourage the seeds to germinate, and by thorough and frequent hoeing; by a short rotation with increased root or hoed crops; and by harrowing after harvest to encourage seeds to germinate for subsequent destruction of the seedlings.

As in the case of Knotweed the newly-unfolded cotyledons are long and narrow (1 in. long by $\frac{1}{4}$ in. broad), but larger and broader than in Knotweed (fig. 21). The stem below the cotyledons is reddish. The first true leaves, though small, are typical of those of the mature plant—heart- or arrow-head shaped. The growing plant soon begins to elongate, and a little later to branch and twine round the nearest plants which will support it. The leaves are 1-4 inches long and shortly stalked; the flowers are very small, greenish-white, and in 4-10-flowered

loose clusters, terminal or axillary. The fruits or "seeds" are rough, black, and triangular.

Docks are among the worst weed pests of the farmer and gardener,



FIG. 19.

Left: Knotweed (*Polygonum Aviculare* L.). Right: Black Bindweed (*P. Convolvulus* L.). Both $\times \frac{2}{3}$.

and occur both in arable and grass land. They are well known to all as perennial weeds with large fleshy tap roots, broken portions of which are capable of forming new plants by means of adventitious buds, while they have great power of resisting drying. It is there-

fore almost a hopeless task to try to destroy large areas of docks by spudding (though this plan might succeed were the spudding

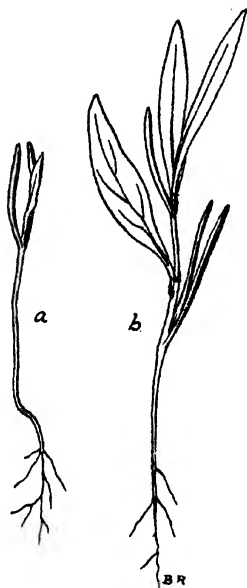


FIG. 20.—SEEDLING OF KNOTGRASS (*Polygonum aviculare* L.).
a, cotyledon stage; b, later stage showing first leaves. Natural size.

sufficiently frequent). In arable land docks must be turned out by ploughing and cultivating, and be burnt after collection by hand. The

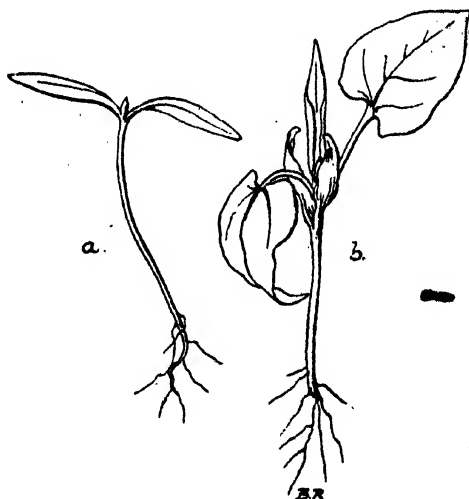


FIG. 21.—SEEDLING OF BLACK BINDWEED (*Polygonum convolvulus* L.).
a, cotyledon stage; b, later stage showing first leaves. Natural size.

docking iron too should be employed both on arable and grass land in damp weather, when many docks may be raised whole, or nearly so. If

spudding in grass land be followed by the use of sulphate of ammonia—a pinch on the top of each cut dock root—good results will follow, the plants generally dying. In arable land seedling docks may be easily destroyed in hot sunny weather by the free use of the hoe, which should be particularly employed against them in the autumn, about which time the seedlings become established.

The seedlings of docks have cotyledons which are somewhat longish-oval in shape, dark green in colour, and stalked. The first leaves before opening are characteristically rolled and pointed upward. The young plant is much tinged with red, and the unfolding leaves have broad petioles and show a definite mid-rib. The portion of the stem to which the cotyledons are attached is thickened and thins out downwards towards the growing tap root, which assumes its typical shape as the



[Photo: H. C. Long.]

FIG. 22.—SEEDLING DOCKS (*RUMEX* SP.).

young plant matures (fig. 22). The mature plant bears large oblong-lanceolate leaves on slender stalks.

Couch Grass is generally recognized as the species *Triticum* (*Agropyrum*) *repens*, but there are several other grasses to which the names Twitch, Squitch, Couch, &c., are given. *Triticum repens* is a grass which is easily recognized by the long, strong, extensively creeping whitish rootstocks, from the nodes or joints of which leaves and flowering stems are sent up (fig. 23). These rootstocks are of the thickness of coarse string or a stout knitting-needle, and broken pieces serve to distribute the pest and give rise to fresh centres of infestation when they are transported. The flowering spike resembles a spike of wheat, the spikelets being placed flat on the stem but rather widely apart. This at once distinguishes the flowering plant from rye grass, in which the spikelets are set on the stem sideways.

Couch can be combated by general cultivation to loosen the soil, and bring the couch to the surface, followed by collection and destruction of the rootstocks; in gardens by deep trenching—an effective plan as we have proved; by thorough hoeing of crops to prevent leaf formation

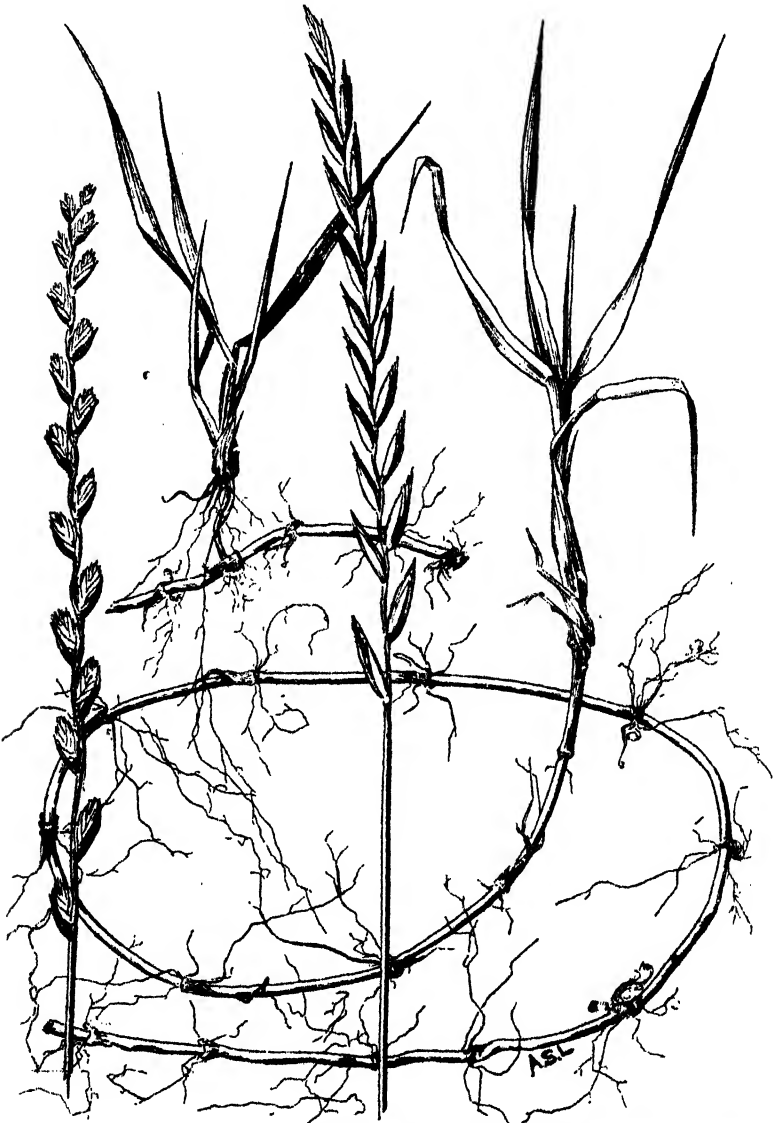


FIG. 23.—COUCH GRASS (*TRITICUM REPENS* L.), SHOWING EXTENSIVE CREEPING ROOTSTOCK AND FLOWERING SPIKE (CENTRE), AND FOR COMPARISON THE FLOWERING SPIKE OF PERENNIAL RYEGRASS (*LOLIUM PERENNE* L.). ALL $\times \frac{1}{2}$.

and exhaust the reserves of food material in the rootstocks; by late hoeing in autumn, when seedlings appear to become established; and generally by the growth of heavy crops, which always tend to smother out weeds.



[Photo: E. J. Wallis.]

FIG. 24.—PRUMNOPITYS ELEGANS, 15 FEET IN HEIGHT.

(To face p. 50)



[Photo: E. J. Wallis.

FIG. 25. --*FAGUS OBLIQUA*, 25 FEET IN HEIGHT.

SOUTH AMERICA IN ITS RELATION TO HORTICULTURE.

By A. W. HILL, M.A., F.L.S.

[Read, October 25, 1910.]

THE subject of South America in its relation to Horticulture is of so wide a character that it is not possible to touch on more than one of its aspects in the course of a lecture. Owing to the vast extent of the country and the diversity of climatic and physical conditions, the flora is highly varied and extremely rich in subjects which are suitable for horticultural purposes.

I might dwell on the tropical products of the Amazonian forests and of the forests of the great basins of the Orinoco and Magdalena in the north, where many of the palms which adorn our stoves and tropical houses in Europe have their homes: where also several of our more remarkable orchids and nearly all the great pineapple family, the *Bromeliaceae*, are to be found. Then again there is the drier tropical country of Eastern Brazil, where many strange vegetable products, only met with occasionally in Botanic Gardens, grow, a territory which is also the home of the Ceara rubber, *Manihot Glaziovii* (the analogue of the *Hevea* of the Brazilian forest), and other recently discovered rubber-yielding species of this genus. The alpine and sub-alpine zones of the Andes abound with plants of interest to the horticulturist, but have yielded relatively few plants to the cultivator, though among orchids the genera *Epidendrum*, *Oncidium*, *Masdevallia*, and *Odontoglossum*, which come mainly from this region, may be mentioned in passing. Many plants of great interest and floral beauty await our enterprise among the higher mountains, but difficulties of transport at present act as an almost insuperable barrier to their successful introduction to this country.

The plants from the regions to which I have referred, however, are rather the plants of the few than of the many, and I think it will be of more general interest to refer in greater detail to the plants of the temperate southern region of Chile and Argentina, since to these countries we owe many of our most useful and beautiful garden shrubs and herbs. Such plants can be grown without any particular difficulty, and are, in fact, grown by everyone who loves a garden and by many who possess a plot of ground filled with shrubs and bedding-out plants such as *Calceolarias*, *Fuchsias*, *Berberis*, etc., about which they do not particularly care and as to whose original home they may not have the faintest idea.

Then again, the plants of this region have a more special interest for the botanist since many of the South American genera have close allies in New Zealand, and we are able to grow our South American plants alongside their New Zealand relations, and may also be inspired thereby to indulge in speculations as to the connexion which may

formerly have existed between these now widely separated countries. Such speculations are all the more interesting because in our own Falkland Islands we have an outpost on the way to New Zealand, and also because the New Zealand botanists have recently done so much in the exploration of their outlying Southern Islands to help in bridging the gap which lies between the two regions.

I do not propose to discuss in detail the physical characters of the southern part of South America, about whose products I am speaking, but rather to remind you of the debt horticulture owes to this region and of the familiar South American plants which enrich our gardens, whose origin may perchance be unknown to the majority of us. It has often occurred to me that were we to collect together the plants of a particular country into a portion of our gardens set aside for the purpose, we should have a particularly interesting and instructive object-lesson which might form an antidote to some of the fashionable notions of gardening of the present day.

The facts which I wish to bring to your notice are not new; they may be found in various works of reference, but owing to the inaccessibility of some of the literature I have been requested to publish the substance of my lecture.

For the sake of convenience I have divided my materials into different categories, such as trees and shrubs, herbaceous plants, etc.

In the first place, then, I wish to call your attention to some of the trees and shrubs of Southern South America, the majority of which are found in the moist temperate region of South Chile. This country, unlike the dry regions to the north, has a mild climate with abundant rainfall not unlike our own, the country is park-like in character and most of the plants will succeed unprotected in the British Isles, or at least in the southern and western counties. Several trees and shrubs have also been introduced from the Andean region of South Chile, Argentina, the island of Chiloe, and the Magellanic region.

One of the most characteristic and well-known of Chilean trees is the 'Monkey-Puzzle,' *Araucaria imbricata*, which, grown as a specimen tree in small gardens, is not always a thing of beauty. It was discovered by Don Francisco Dendariarena of the Spanish Navy in 1780, and was introduced to this country in 1796 by Archibald Menzies. Menzies sent some of the plants to Sir Joseph Banks at Kew, where one of them survived until 1892. The tree was very scarce in this country until the collector Lobb sent home a large consignment of seeds in 1844. The only other species (*A. brasiliensis*) of this ancient genus in South America is found in the Brazilian mountains, and is not hardy out of doors in this country. These two trees are of particular interest when it is remembered that the other living representatives of the genus are found in Australia, Norfolk Island, and New Caledonia, and that fossil *Araucarias* have been discovered all over the globe. Other coniferous trees of value are *Libocedrus chilensis*, *L. tetragona*, *Fitzroya patagonica*, *Saxegothea conspicua*, *Prumnopitys elegans* (fig. 24), and some species of *Podocarpus*. The Pines so typical



FIG. 26. ESCALLONIA PHILIPPINA.

[Photo: E. J. Wallis,

(To face p. 52)

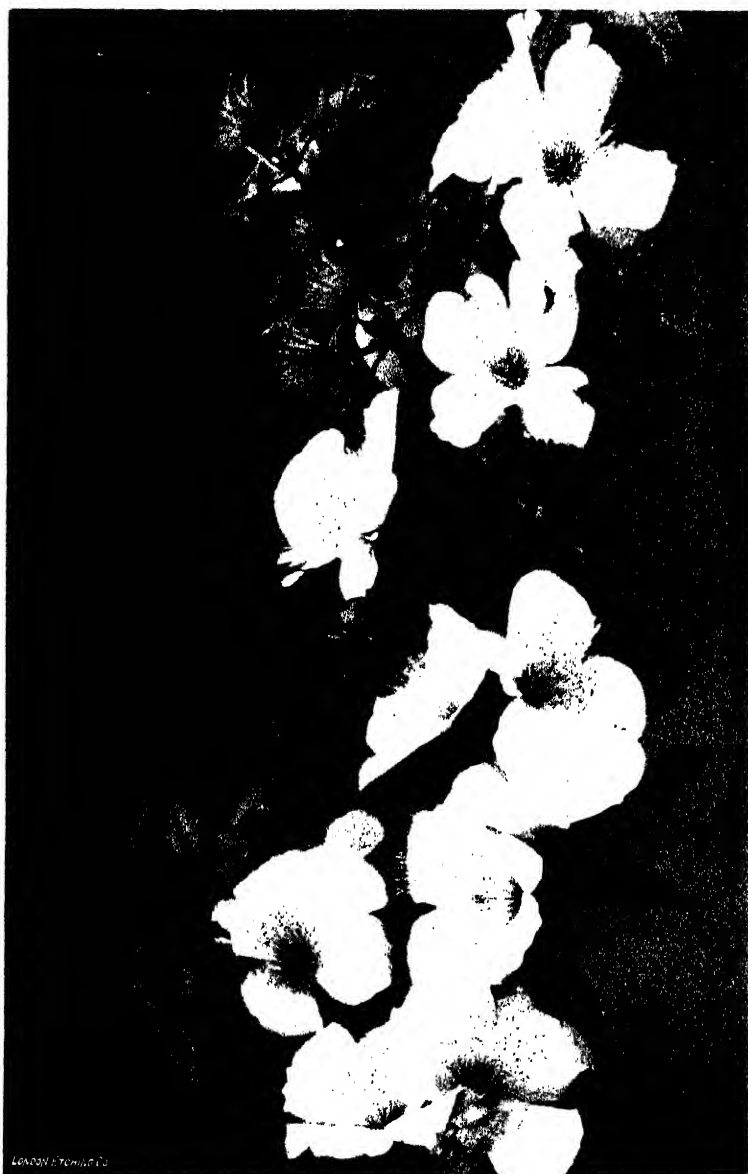
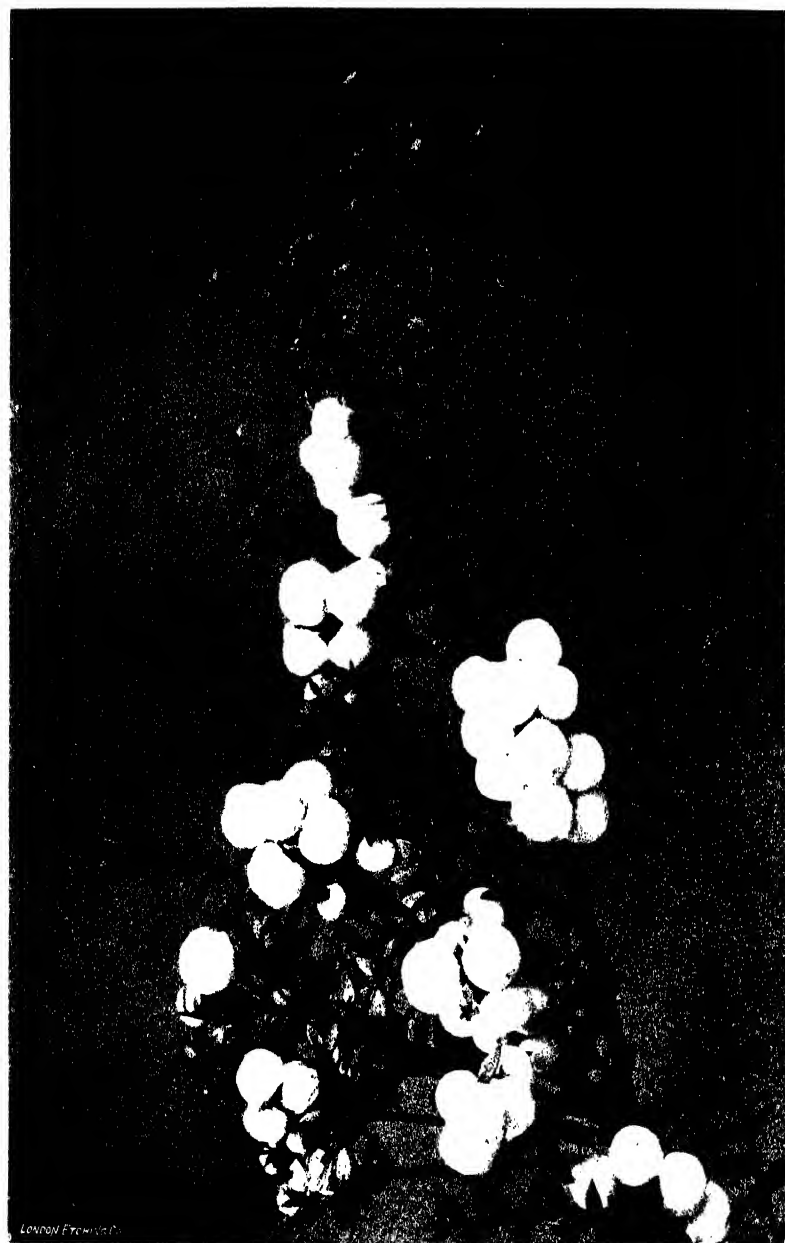


FIG. 27. *EUCALYPTUS PINNATIFIDA*

Thomson, E. J. Weller.



LONDON: ETC.

FIG. 28. *PERNETTYA MUCRONATA*.

[Photo: E. J. W. W. W.]



FIG. 29.— *BEGONIA PEARCEI*.

(Photo: C. P. Rafter.)

(To face p. 53)

of the Northern hemisphere do not extend farther south than Mexico.

Of deciduous trees the antarctic beeches will probably prove of interest in cultivation. They belong to the section *Nothofagus* of the genus *Fagus*, and include *F. obliqua* from Chile (fig. 25) and *F. antarctica* and *F. betuloides* from the Magellanic region and Tierra del Fuego.

F. obliqua is now making a handsome plant at Kew and proving well worthy of cultivation. *F. antarctica* is also a nice little tree, and a specimen of the variety *uliginosa* flowered at Kew two years ago, and was figured in the *Botanical Magazine* (t. 8314) last year. It is of some interest to notice in passing that of the twelve species of this southern hemisphere section of the genus *Fagus*, seven species belong to South America and three to the Australian region.

Perhaps in the domain of hardy shrubs we have laid South America under greater contribution than any other part of the world except China and Japan. *Berberis Darwinii*, one of the parents of that most useful and ornamental shrub *B. × stenophylla*, was first discovered by Charles Darwin in Chile, and was introduced to cultivation by Messrs. Veitch in 1849 through their collector Lobb. *B. × stenophylla* arose as an accidental cross between *B. Darwinii* and *B. empetrifolia*, a native of the Magellan region, in the nursery of Messrs. Fisher, Son, and Holmes, Handsworth, Sheffield. The beautiful *Berberidopsis* with its crimson flowers, which is a striking feature in some Cornish gardens, forms a link between the natural orders *Berberidaceae* and *Lardizabalaceae*. The latter order is of interest since its genera only occur in Chile and Eastern Asia, *Lardizabala* being a native of Chile, while its relative, *Akebia*, an interesting plant for sheltered walls, comes from China.

Another evergreen shrub or small tree is *Azara microphylla*, with its small, deliciously scented flowers, which is found near Valdivia in Chile and was sent home by R. Pearce when collecting for Messrs. Veitch and Son of Exeter.

Embothrium coccineum, the flame bush, which flourishes in Cornwall and sheltered spots in South Devon, first flowered at Exeter in 1853 and is a native of the Magellan region.

Drimys Winteri, the 'Winter's bark,' often found in West country gardens, is another of our beautiful evergreen shrubs from Chile, and its introduction is due to the collector Lobb. This shrub possesses an interest to botanists, in addition to its pretty cream-coloured flowers, in the fact that it is a member of a typically antarctic genus represented also in New Zealand, and one species has been found as far north as Borneo on the summit of the great mountain Kinabalu with a few other antarctic plants.

The *Escallonias* again, some of which make such excellent and beautiful hedges in the West country and at seaside places, are a purely South American group, and some of them which are quite hardy deserve more attention than they have received. *Escallonia Philip-*

piana, introduced by Pearce in 1873 and named by Masters after the late Professor R. A. Philippi, the distinguished veteran Chilian botanist, forms a neat little bush, and is a useful plant in gardens, as it produces its white flowers late in the summer (fig. 26). It is also worthy of note that this species and *E. macrantha*, from the island of Chiloe, are the parents of the beautiful *E. × langleyensis*, which was raised by Seden at Messrs. Veitch's Langley nursery. The hybrid is perfectly hardy, and produces elegant sprays of pink blossom, and should be more widely planted. Several other South American species of *Escallonia* are grown at Kew which require protection during the winter, but are excellent subjects for cultivation in the west and south-west of these islands. A very beautiful shrub, but not always easy of culture, is *Eucryphia pinnatifolia*, also an introduction of Messrs. Veitch (fig. 27). At Kew it thrives in a peaty soil with the protection afforded by planting it among heaths. The plant has been placed by botanists in several natural orders, including *Sarifragaceae*, *Hypericineae*,* and *Rosaceae*. A plant deserving of especial mention from its beauty in leaf, flower, and fruit is *Pernettya mucronata* (fig. 28), a native of the Magellanic region. It is no doubt most ornamental when loaded with its white, pink, or red berries in the autumn, and is a valuable dwarf shrub for planting in large patches. One of the most curious evergreen shrubs from Chile is *Fabiana imbricata*, a heath-like member of the *Solanaceae*, introduced as long ago as 1838. It is not perfectly hardy, but in the Cambridge Botanic Garden a fine specimen has lived out of doors against one of the houses for many years, and produces masses of trumpet-like flowers every summer. Other South American shrubs which may be mentioned are *Desfontainea spinosa*, interesting from the close similarity of its leaves to those of the common holly, and *Tricuspidaria dependens*, both of which are hardy in some parts of England and Ireland.

Turning now to climbing and wall plants, we find that most of the South American introductions are subjects for the cool greenhouse. One of the most striking and beautiful is the Solanaceous plant *Streptosolen Jamesoni*, which in the gardens of the Riviera and Algeria forms gorgeous masses of orange-red colour on the walls and houses. It was discovered by Lobb in 1847 in Northern Peru at an elevation of six thousand feet, and named after W. Jameson, who lived at Quito for many years and contributed very largely to our knowledge of the flora of North Peru and Ecuador. The plant was lost to cultivation soon after its first introduction, but it was re-introduced in 1882. Many of our most beautiful greenhouse climbers, belonging to the genera *Stigmaphyllon*, *Malpighia*, *Tacsonia*, *Tecoma*, and *Tibouchina*, are natives of the warmer parts of South America. Some of our species of *Abutilon* have been brought from Chile, and to this region we owe *Lapageria*, *Bomarea*, and *Alstroemeria*. The well-known *Lapageria rosea* was introduced by Mr. Richard Wheelwright, who sent plants home to Kew in 1847, but the white variety did not reach this country until 1860.



FIG. 30.—TYPICAL BUSH IN CHATHAM ISLAND.

(To face p. 54)



FIG. 31.—*SENECIO HUNTII*.

Many other unfamiliar plants of this class might be mentioned which are not adapted to general cultivation, but I will pass on to mention a few florist's flowers of South American origin which are invaluable for our greenhouses and gardens in summer time. I refer more particularly to the tuberous-rooted Begonias, which have been "improved" from several very beautiful wild species brought from the high Andes of Peru and Bolivia. The wild species which have played the most important part in the production of our modern garden varieties are *B. boliviensis*, *B. Pearcei*, *B. Veitchii*, *B. Davisii*, and *B. rosae-flora*. *B. boliviensis* is different in character from the other species mentioned, and has long drooping scarlet flowers. It was used by Seden in the production of the first hybrid tuberous begonias in 1869. The influence of the yellow-flowered *B. Pearcei* (fig. 29) with its elegantly marked leaves can be traced in all our modern yellow-flowered varieties. Both this species and the brilliant scarlet-flowered *B. Davisii* have left their mark conspicuously on the general habit of our modern forms, and from many points of view are to be preferred to some of the over-grown Camellia-like monstrosities which pass for Begonias at the present day. *B. rosae-flora*, another beautiful wild species, is of interest since the first white forms of the tuberous Begonia arose from the selection of pale-coloured seedlings of this species.

It is a matter of regret that several of the original introductions of Begonia species have now been lost to cultivation, and many others of great beauty are only to be met with occasionally in Botanic Gardens.

Some interesting results in the production of winter-flowering varieties have recently been obtained by crossing *Begonia socotrana* with species from the Andes.

Many other greenhouse plants, such as *Browallia*, *Gloxinia*, *Gesnera*, *Heliotropium*, might be mentioned, which have their home in South America, and for whose introduction we are indebted in many cases to the activities of the collectors of Messrs. Veitch, but there are two genera of herbaceous and shrubby plants to which I wish more particularly to draw your attention. They are the Fuchsias and *Calceolarias*, some species and varieties of which are old-fashioned favourites in the humblest of our gardens. Both are large genera, and the majority of their species have their home in South America, but representatives are also to be found in New Zealand, and Fuchsias extend as far north as Mexico.

Over two hundred species of *Calceolaria* have been discovered in South America. Many of the most remarkable unfortunately have never reached this country alive, and some of the more beautiful species are by no means easy of cultivation since it has not been found possible to propagate them by seed. In these two genera also, as is so often the case, the pure species tends to be neglected because a larger-flowered and perhaps less artistic hybrid or variety has been raised. In Botanic Gardens, however, the species may still be found, and the following, among others, may be mentioned as worthy of general attention: *C. alba*, *C. fuchsiaefolia*, *C. plantaginea*, *C. pumila*,

C. rugosa, *C. virgata*, and *C. violacea*. The last-mentioned plant is sometimes placed in a distinct genus, as the corolla is open like that of a small foxglove, and has not the characteristic saccate lower limb which we associate with the genus. *C. violacea* has a further interest since it is closely allied to *C. Sinclairii* and other species from New Zealand in which the corolla has a similar shape.

The first *Fuchsia* to come to England is said to have been brought over by a sailor at the end of the eighteenth century, and to have been purchased from its owner by Mr. Lee, a nurseryman of Hammer-smith, who noticed it in a cottage window. The South American *Fuchsias* of interest include *Fuchsia macrostemma* from Chile with its many varieties, some of which make such useful hedge plants in the warmer parts of our islands. This species has also played a conspicuous part in the formation of the many cultivated varieties of *Fuchsias*, the exact history of whose origin has been lost. *F. simplicicaulis* from Peru is perhaps the most beautiful and effective of all the species when in full flower, with its elegant drooping racemes of slender crimson flowers.

There are other South American species seldom met with in cultivation, but a reference to *Nicholson's Dictionary*, the *Botanical Magazine*, and the Kew hand-lists will show that many species have been or may be grown which are worthy of cultivation. *F. microphylla* and *F. fulgens* among Mexican species and *F. excorticata* and *F. procumbens* from New Zealand also deserve mention.

One of the earliest introductions from South America to our gardens is the common 'Nasturtium' of gardeners. *Tropaeolum minus* is a native of Peru and was introduced in 1596, and the larger climbing species, also from Peru, was brought over in 1686. Both plants are too well known to need any further mention, but the less-known species—*T. peregrinum*, *T. speciosum*, *T. tuberosum*, *T. polyphyllum*, *T. azureum*—might, with advantage, be more widely grown.

Of annuals which brighten our gardens, I need only recall such genera as *Schizanthus*, *Salpiglossis*, *Alonsoa*, and *Petunia*. Our modern *Petunias* are all of hybrid origin from two species *P. nyctaginaeflora* and *P. violacea*, from the La Plata region, but *P. violacea*, unfortunately, has been lost to cultivation for many years. With fruit and vegetables of South American origin, such as Potatoes, Tomatoes, and Pineapples, it is hardly my province to deal, but when I mention in conclusion that our modern varieties of the Strawberry are considered to be due to direct modification of the Chilian Strawberry *Fragaria chiloensis*, which reached Europe about 1712, I feel that you will agree with me that the debt of Horticulture to South America is by no means a small one.

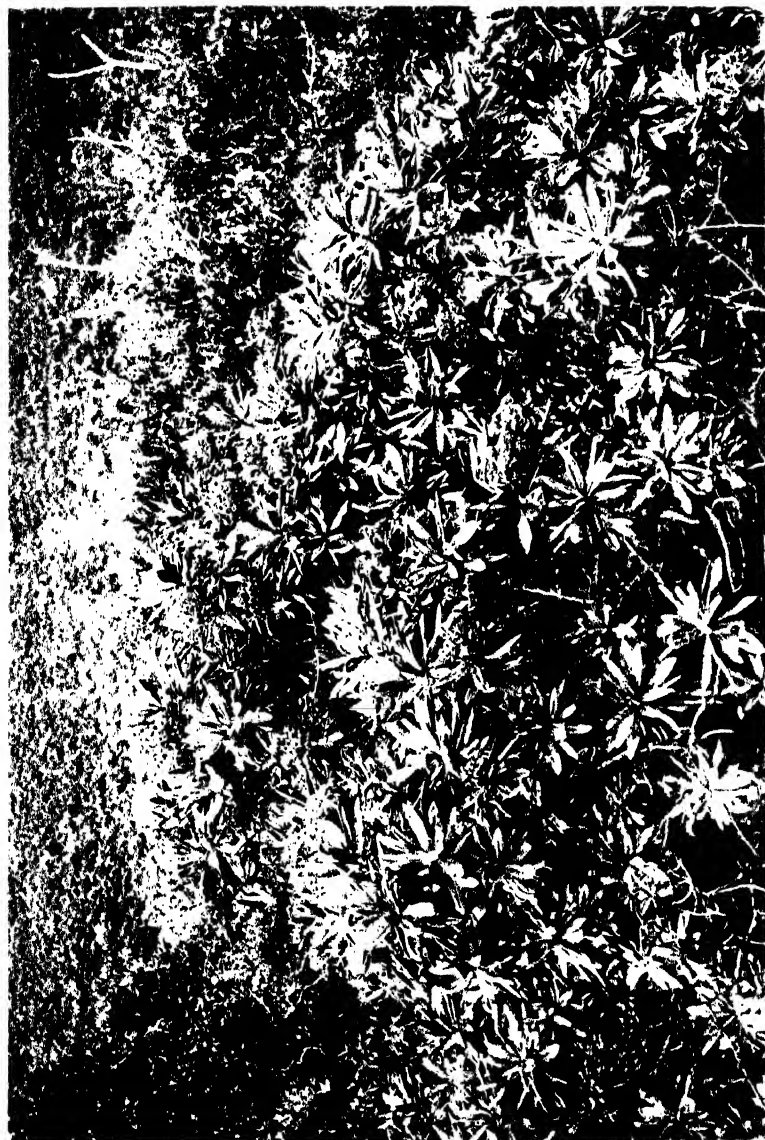


FIG. 32.—TOP OF *SENECIO HUNTII* IN FLOWER.

(To face p. 36.)



FIG. 53. - *OLEARIA TRAVERSII*.



FIG. 34.—*PSEUDOPANAX CHATHAMICUM*.



FIG. 55.—CYPRESSUS LAURATUS, SHOWING EFFECT OF WIND.

PLANTS OF CHATHAM ISLAND.

By CAPTAIN A. A. DORRIEN-SMITH, D.S.O.

[IN December 1909, Captain Dorrien-Smith visited Chatham Island on a plant-hunting expedition, and secured a number of plants which he hoped to be able to grow in the British Isles, since from the latitude in which the Island lies (44° S.) it was reasonable to hope that some at least of the plants native there would be hardy in the warmer parts of S.W. England and Ireland, and especially in the Isles of Scilly. Many of the plants collected died on the voyage home as the tropics had to be passed, but some survived.

Chatham Island is of volcanic origin and lies some distance from the east coast of New Zealand. It is the largest of the group to which it belongs, being about 30 miles long and having an area of about 350 square miles. Near it lie Pitt Island containing about 15,000 acres and several rocks and islets.

The climate is a mild one, only a degree or two of frost being experienced in the winter. It is on the whole very similar to S.W. Ireland. The rainfall amounts to only about 30 inches, but there are many damp days, moisture falling on an average about 190 days in the year.

One part of the island, towards its southern end, rises to an elevation of 1,000 feet, and becomes more and more boggy towards the top. There is a large lagoon cut off from the sea by stretches of blown sand which occupy considerable areas on the island, and there are several large fresh-water lakes, of which Lake Huro is the largest.

The figures, which are from photographs by Captain Dorrien-Smith, well depict the vegetation of the island.]

“ TYPICAL BUSH.”

FIGURE 30.

Nowhere in the Chatham Islands is the forest of any great height; 25 feet would be a good average height, with a maximum height of 40 feet to 45 feet in some parts of the lowland district between the great Lagoon and Lake Huro.

The forest is made up chiefly of the following trees:—*Corynocarpus laevigatus* (Karakā), *Pseudopanax chatamicum*, *Hymenanthera chatamica*, *Myrsine* (*Suttonia*) *chatamica*, *Veronica gigantea*, *Dracophyllum arboreum*, *Olearia Traversii*, Tree ferns, *Cyathea dealbata*, *C. medularis*, *C. Cunninghamii*, *Dicksonia fibrosa* (*antarctica*), *D. squarrosa*, the liane, *Ripogonum scandens*, and in places the palm *Rhaphalostylis sapida*, with *Senecio Huntii* scattered here and there.

SENECIO HUNTII.

FIGURES 31 AND 32.

Senecio Huntii is a shrub or small round-headed tree 6 feet to 20 feet high, usually more or less glandular-pubescent and viscid in all its parts. It is found chiefly on the higher ground, where there is plenty of moisture, but not on the bogs. The branchlets are marked with the scars of the fallen leaves; leaves crowded 2 inches to 4 inches long, usually glabrous above and clothed with a thin fulvous tomentum beneath. Flowers in a terminal panicle, large, dense and much branched, from 3 inches to 5 inches broad, bright yellow. The plants are more or less scattered about the “bush,” and seldom found in a compact mass; it is closely allied to *S. Stewartiae*, found on Herekōpere Islands, in Foveaux Strait, and on the Snares Islands.



FIG. 36.—*VERONICA GIGANTEA*, DEAD AND ALIVE.



FIG. 37.--VERONICA GIGANTEA.

(To face p. 59)

OLEARIA TRAVERSII.

FIGURE 33.

This forms a small tree 30 feet high, with a trunk 1 to 2 feet in diameter. It is abundant in the woods on the island, and is easily recognized by the opposite leaves, axillary panicles, and discoid heads. The wood as timber is probably the best on the islands, and is used largely for fencing, when it is fairly durable. The plant is not of much horticultural interest, as its flowers are rather insignificant; but economically I attach considerable importance to it as a shelter plant, and it is most conspicuous on the island by the way it grows in very exposed places. It is probably as hardy as *Euonymus maritimus*, and is far more durable.

PSEUDOPANAX CHATHAMICUM.

FIGURE 34.

This plant is fairly common, and found scattered about among the forest. The mature tree is not unlike *Pseudopanax crassifolium*, so common on the mainland of New Zealand, and known as the "Lance wood." The plant, however, can be at once separated by the absence of deflexed leaves in the young state, the larger and broader leaves of the mature plant, and the large globose fruit. It attains a height of 25 feet.

CORYNOCARPUS LAEVIGATA.

FIGURE 35.

This tree is one of the chief constituents in the Chatham Island forest, and is the largest tree there, attaining a height in places of 45 feet. Its foliage is everywhere perfectly glabrous, and the tree bears conspicuous orange-coloured drupes 1 to $1\frac{1}{2}$ inch long, which formed one of the chief vegetable foods of the Maoris; the seed, however, is poisonous. Except in the Isles of Scilly, the tree is nowhere hardy in Great Britain. It is commonly known to New Zealanders by the native name, *Karaka*.

VERONICA GIGANTEA.

FIGURES 36 AND 37.

This remarkable *Veronica* is well named *gigantea*, and is a most striking feature in the forest. It is not uncommon, and when in flower is very effective. Mr. T. F. Cheesman has classified it as a variety of *V. salicifolia*; but I never saw it assume the habit of this species, as everywhere it had a distinct trunk, and formed a miniature tree 15 to 20 feet high, while the seedling form differs entirely. [See Cockayne in Trans. N.Z. Inst. XXXIV. (1902), p. 319.]



FIG. 38.—*DRACOPHYLLUM PALUDOSUM*.



FIG. 59.—GENERAL VIEW OF OLVARIA SUBNIVALIA.

Phormium tenax on left. Marchantia cephalocarpa, with Pea-clatookia, growing through it in foreground.
The white patch below the shrubs is Sphagnum.

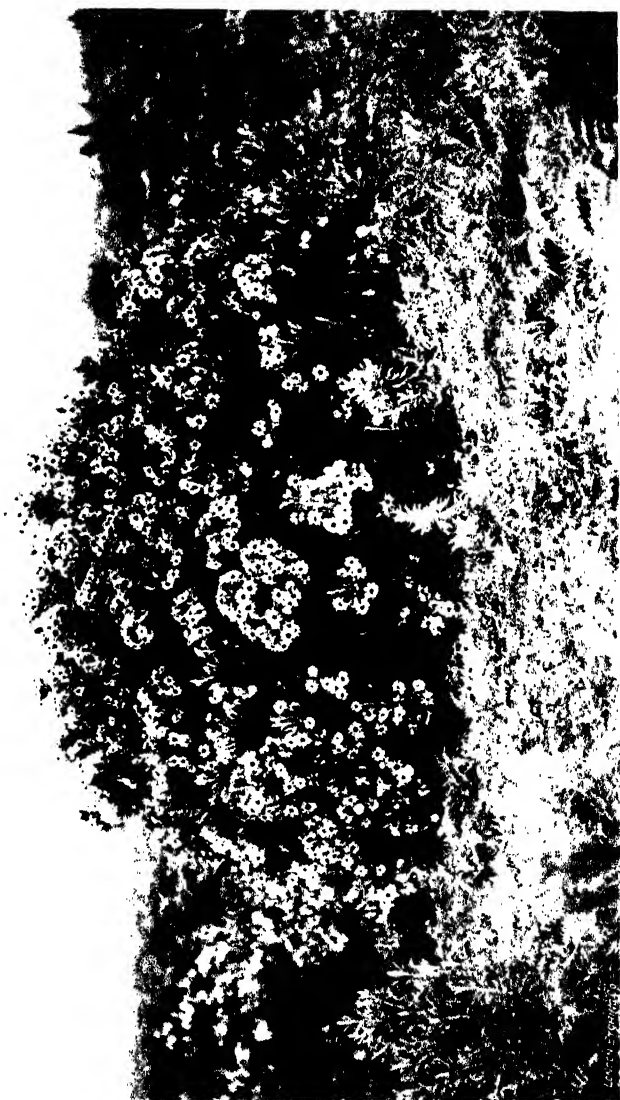


Fig. 40. *OLEARIA SEMIDENTATA*.

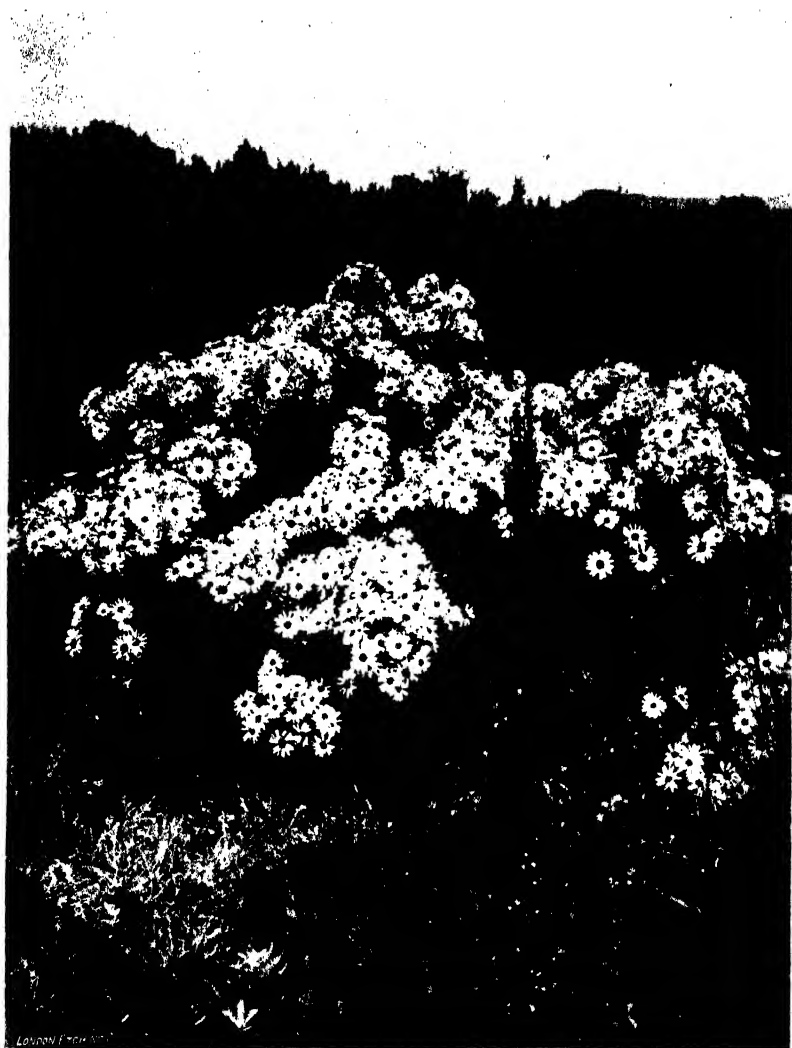


FIG. 41.—*OLEARIA SEMIDENTATA*, WITH *DRACOPHYLLUM PALUDOSUM* BEHIND IT.

(To face p. 61)

DRACOPHYLLUM PALUDOSUM.

FIGURES 38 AND 41.

This lovely little epacrid grows everywhere where it is open and the ground sufficiently peaty; it forms with *Lepyrodia Traversii* and *Olearia semidentata* the chief plant in the upland bog country, and appears directly after Sphagnum moss, as soon as the ground has become a little drier. The flowers are white, about $\frac{1}{4}$ inch long in dense 3 to 6 flowered spike-like racemes. Plants only an inch or so high flower, and it attains a maximum height of about 6 feet. It is easily distinguished from *D. arboreum*, in that the leaves are no longer or broader in the young state than they are in the mature.

OLEARIA SEMIDENTATA.

FIGURES 39-42.

This shrub is the most beautiful and graceful of all the 35 species of *Olearia* endemic in New Zealand. It is a plant 3 feet high, forming a compact rounded bush, often 3 feet to 4 feet through, bearing a mass of solitary flower heads, 1 inch to $1\frac{1}{2}$ inch diameter, with involucreal scales in about three series, acute, cobwebby at the tips. The ray florets lingulate, purple, disc florets violet purple. The branches are slender, more or less clothed with white floccose tomentum; leaves are numerous, close set, ascending, $1\frac{1}{2}$ inch to $2\frac{1}{2}$ inches long by $\frac{1}{4}$ inch to $\frac{3}{8}$ inch broad. Lanceolate or linear lanceolate, acute, gradually narrowing to a sessile base, slightly cottony above—more so when young—white, with adpressed tomentum beneath. The peduncles are clothed with numerous small lanceolate bracts. I have seen plants 6 inches high in flower, and find that the bush is more often compact than straggling in habit.

OLEARIA CHATAMICA.

This is a stouter species than *O. semidentata*. Its leaves are much larger, 1 inch to 3 inches long, and broader, $\frac{1}{2}$ inch to $1\frac{1}{2}$ inch, and most variable in shape. It comes very near to *O. angustifolia*, but it is distinct by the broader leaves and more slender peduncles, with fewer bracts. It grows in compact masses on the cliff edges, or scattered about among the upland bogs in association with *O. semidentata*. The ray florets are purplish or white, while the disc florets are violet purple. Flower heads solitary, large, $1\frac{1}{2}$ inch to $1\frac{3}{4}$ inch diameter.

It is a very fine species indeed, but its effect when in flower is not to be compared with *O. semidentata*.

STYPHELIA ROBUSTA.

FIGURE 43.

This plant is very near *Styphelia* (*Cyathodes*) *acerosa*, but distinguished by having larger, broader leaves, which are not at all pungent, and end in obtuse callous tips, and also by the larger fruit. It grows to a considerable height, 12 feet or less, with leaves $\frac{1}{2}$ inch to $\frac{3}{4}$ inch long, $\frac{1}{8}$ inch to $\frac{1}{4}$ inch broad, narrow, linear-oblong or linear-lanceolate. The flowers are $\frac{1}{2}$ inch long, and not very conspicuous, but the berry is large and globose, $\frac{1}{8}$ inch to $\frac{1}{4}$ inch in diameter, and bright red. It grows on the open upland drier peat, or on the limestone rocks round the Great Lagoon in association with *S. Richei*; it is not uncommon on the island.

PLAGIANTHUS BETULINUS var. CHATAMICUS.

FIGURE 44.

This plant grows in patches between the Great Lagoon and Lake Huro, and is not common on the island. The plant of the mainland (New Zealand) is a most variable one; but here it seems to retain a uniformity of type, although differing not at all from one found in New Zealand. It is an effective, graceful tree, bearing masses of greenish white flowers, unisexual, in terminal and axillary decompound panicles 4 inches to 9 inches long; pedicels slender. It is practically a dioecious plant, but sometimes a few hermaphrodite flowers are mixed with the males. The seedling form does not differ from that of the mature tree, while New Zealand seedling forms do.



FIG. 42. *OLEARIA SEMIDENTATA* VAR. *ALBIGLORA*.



FIG. 43.—*STYPHELIA ROBUSTA* ON AN UPLAND DRY BOG SURROUNDED BY
PTERIS ESCULENTA (BRACKEN).

(To face p. 63)

CAREX APPRESSA var. SECTOIDES.

FIGURE 45.

This *Carex* is found in marshy ground, generally on the side of a rivulet, in association with *Phormium tenax*. It is a large species, often 2 feet to 4 feet high, and its rhizomes often form a kind of trunk; the culms are slender and drooping above, leaves numerous, almost $\frac{1}{2}$ inch broad, hard, rigid and acutely keeled.

MARCHANTIA CEPHALOSCYPHA?

FIGURE 45.

This "curse among your pots and ferneries" came as a boon and blessing to man on the upland bogs; it thrives where the slope of the ground makes it too difficult for the *Sphagnum*; in such a place where a small trickling rivulet would gush over its banks after a shower of rain, here it takes possession, covering half an acre, more or less, and forms a hard crust, over which it is safe to walk; but a 6-foot pole driven through it would not touch the bottom.

OLEARIA LYALLII.

FIGURE 46.

This plant was introduced by Mr. F. A. D. Cox, and is a native of Ewing Island, in the Auckland Islands group, where the whole island is covered with it; and also on the Snares it forms a forest of large shrubs or small trees 15 to 20 feet high, sometimes reaching 30 feet, with trunks 18 to 24 inches in diameter. Leaves 4 to 8 inches long, elliptic ovate or orbicular ovate, abruptly acuminate, shortly petiolate, very rigid and coriaceous, white with floccose tomentum above, but becoming glabrous when old; under surface densely clothed with soft white wool; margins irregularly doubly crenate. Racemes terminal, stout, 4 to 8 inches long; heads large, $1\frac{1}{4}$ to $1\frac{1}{2}$ inch diameter, dark brown. The foliage is quite magnificent, but the flowers are somewhat disappointing. The plants grow in a sandy peat, and like a moist climate. Since my visit to New Zealand in 1908 Dr. L. Cockayne has found growing on Stewart Island plants practically identical with the above, which so far had only been identified as *O. Colensoi*.

ACIPHYLLA DIEFFENBACHII.

FIGURE 47.

This species of the Carrot family has not yet been properly classified. The plant is extremely rare now on the islands, and is only found in places inaccessible to stock, which devour it greedily wherever they can get at it. I found it growing on the precipitous western cliffs of Chatham Island, and was shown a large patch of it growing on a semi-detached cliff-island, which I examined, but only found it in seed, except the plant here shown. Unfortunately, the specimens sent to Mr. Cheesman in New Zealand were in such a bad state of preservation when they arrived as to be useless for identification. Mr. Cheesman says, in his "Flora of New Zealand," that the fruit of this is quite unlike *Aciphylla*, *Ligusticum*, or *Angelica*, to all of which genera it has been referred.



FIG. 44.—*PLAGIANTHUS BETULINUS* VAR. *CHATAEGUS*.
Young tree in foreground; mature tree, 35 ft. in height, showing white stem,
behind.

(To face p. 64)



FIG. 45.—*CAREX APPRESSA* VAR. *SECTOIDES*.

In the foreground *Marchantia cephaloscypha*, with a rivulet running through it.



FIG. 46.—*OLEARIA LYALLII* (INTRODUCED) GROWING IN MR. F. A. D. COX'S GARDEN.



FIG. 47.—*ACHRYLIA DIEFFENBACHII*.
Poa chataniva on the left; *Geranium Traversii* on the right.

(*Tioga* p. 65)

ALPINE PLANTS IN THEIR NATIVE HAUNTS.

By R. REGINALD C. NEVILL, B.A., LL.B., F.R.H.S.

[Read March 28, 1911.]

Numerous botanists have attempted to sub-divide alpine vegetation into zones of altitude. This division has not been attended by very useful or satisfactory results, neither have the various authorities been able to agree as to a classification at all approaching universal application. The celebrated Swiss botanist Dr. CHRIST has, however, adopted a threefold division of alpine and sub-alpine vegetation which is useful mainly because it makes no attempt at being exclusive. The lower zone he terms the zone of deciduous forests, the middle that of coniferous forests, and the upper the alpine zone.* It is as a rule possible when travelling through the Alps to say at any given moment in which of these three zones one may happen to be. I do not mean to suggest that the zones pass from one to the other by sudden transitions, but that the predominance of the deciduous or coniferous trees is readily recognized, and that in each case this predominance is indicative of a corresponding change in other forms of vegetation. The altitude at which one zone ends and another commences varies with local conditions of climate and aspect, but it can be roughly stated that in the Alps the lowest limit of the alpine zone lies somewhere between 5000 and 7000 feet above sea level. A few isolated specimens and groups of Arolla pines and larches may be found above this altitude, but the woods and forests of considerable dimensions cease when this point is reached. In the same way, with the transition from the lower to the middle zone some deciduous trees still appear as stunted and dwarfed specimens when the dominion of the conifer is all but universal. It is, then, to the vegetation which flourishes in the region above the limits of the pine and larch forests—the alpine or glacial region—I wish to direct attention.

Were it possible, it would be exceedingly helpful to horticulturists if a general statement could be made concerning the conditions of the soil or substratum upon which plants thrive in this region. Unfortunately this is, from the nature of the case, quite out of the question. The very irregularity of the earth's surface in alpine regions is in itself sufficient to account for constantly recurring variations in the physical conditions of the soil. The rock face, the grassy plateau, the moraine, the scree slope and the marshy hollow may all occur within a comparatively small area, and the conditions of the supply of moisture may be subject to equally great variations. The only method, therefore, of dealing with the problem of the soil or substratum in alpine regions is to proceed in an absolutely empirical manner, and to give

* Dr. Christ, *Pflanzenleben der Schweiz*, p. 10.

descriptions of certain types of conditions which are frequently to be met with. A classification of the various conditions of soil obtaining in alpine regions is attempted by SCHROETER,* but it is impossible here to do more than to call attention to some of the most characteristic.

The alpine meadow, which is mown twice, and sometimes three times, for hay during the year hardly comes within the alpine zone as understood by DR. CHRIST; but it produces such a variety of flowers of the greatest beauty that it can hardly be passed by, more especially as it very frequently lies in close proximity to the truly alpine or glacial region. The typical alpine meadow is generally to be found at the bottom of a valley in the high Alps. The soil is of a rich, black, peaty character, formed by the decay of generations of plants or washed down from the adjacent mountain sides. The humus thus formed is usually of very considerable depth, and is supplied with moisture by innumerable intersecting streams running down from the springs on the sides of the mountain to join the glacier stream which flows down the middle of the valley. The distribution of this natural supply of moisture is also facilitated by artificial means. These meadows are, therefore, always damp, and very frequently even marshy. The flora of the alpine meadow is most abundant, consisting largely of such well-known British plants as *Campanula rotundifolia*, *Ranunculus bulbosus*, *R. acris*, *Polygonum Bistorta*, and *Chrysanthemum Leucanthemum*. In the late autumn the meadow saffron, *Colchicum autumnale*, is one of the commonest flowers of the alpine meadow. *Trollius europaeus* and *Veratrum album*, several *Silenes*, *Lychnis*, and *Geraniums* are also of very frequent occurrence.

Above the alpine meadows we come to the high pastures. Here the vegetation becomes more distinctively alpine, its character being determined locally by the supply of moisture and the aspect. These pastures stretch in steep grassy slopes, alternating with comparatively level plateaux almost up to the foot of the glaciers. On the dry slopes such plants as *Antennaria tomentosa*, *Senecio incanus*, *Gnaphalium dioicum*, *Potentilla nivea*, and *P. frigida* may be found, while *Saxifraga aizoides* and *S. stellaris*, *Aconitum Napellus*, *Petasites niveus*, *Pedicularis recutita*, and *Caltha palustris* may be taken as representative of the plants growing on the banks of the many small streams which cut into the pastures. In marshy places among the sedges and rushes, the conspicuous white heads of the cotton grass will here and there indicate the character of the ground and vegetation. Towards the upper limit of the pastures, seams of rock break into the grassy slope, frequently rising one above the other in terraces, so that the moisture from the higher rocks drains down to the lower. In such cases the ground below the rocks will afford appropriate conditions for the growth of the famous "alpenrose" (*Rhododendron ferrugineum*), and associated with it *Vaccinium uliginosum*, *Empetrum nigrum* and *Azalea procumbens*. The upper reaches of the Val Varia, which leads down from the Zwischbergen Pass to the village of Simplon, is an excellent example of this.

* Schroeter, *Pflanzenleben der Alpen*, pp. 66, 67.

Next above the pastures come the moraines and scree slopes. The moraines as seen to-day vary considerably in their composition, some being formed almost entirely of stones and boulders of varying sizes, and others having some of the finely-ground glacier deposit mixed up with the coarser materials which the glacier forming the moraine has transported either on its surface or embedded in the ice. The finer glacial deposit consists of rock powder ground by the glacier in passing over its rocky bed, and containing no organic matter. There is a special moraine flora which passes by imperceptible degrees into that of the alpine pasture, the flora of the old moraine representing the intermediate step. Typical moraine flowers are *Epilobium Fleischeri* and *Linaria alpina*, but many plants which appear here are also to be found on scree and debris which have fallen from the mountain side. Dr. CHRIST speaks of these as Geröllpflanzen (scree plants).* He enumerates *Thlaspi rotundifolium*, *Hutchinsia alpina*, *Cerastium latifolium*, *Geum reptans*, *Aronicum scorpiodes*, *Arenaria biflora*, and *Campanula cenisia* as being typical plants coming within this category. Nothing could offer a more desolate and barren appearance than stretches of scree and moraine. Moisture there appears to be none, but where plants thrive the ear can frequently detect the trickling of water among the stones. Most of these scree and moraine plants possess roots developed to a remarkable degree, and by means of them fasten themselves securely on the loose substratum and make use of all the available moisture. The form of growth of *Geum reptans* is particularly striking. It bears a very strong resemblance to *Geum montanum*, but produces stolons like a strawberry, and by means of these stolons secures a method of propagating itself particularly well adapted to the character of substratum on which it habitually thrives.

Last of all we come to the plants which grow at the highest altitudes on the stony plateaux and ridges below, and even among, the snow fields. These plants Dr. CHRIST calls Gratpflanzen (Arête plants).† Here we find *Gentiana bavarica*, *G. brachyphylla*, *Eritrichium nanum*, *Androsace glacialis*, *Ranunculus glacialis*, *Saxifraga Androsace*, *S. caesia*, and *S. bryoides*. Of these plants *Ranunculus glacialis* has been found at a greater altitude than any other plant in the Alps. I believe that I am right in saying that it has been met with at an altitude of 14,000 feet, while *Achillea atrata*, *Saxifraga muscoides*, *S. bryoides*, *S. biflora*, *S. moschata*, *Androsace glacialis*, and *Gentiana brachyphylla* have been found at altitudes between 13,000 and 14,000 feet. At such altitudes, however, only isolated specimens are met with. I have myself found *Androsace glacialis* in great quantities on the Col de Gietroz at an altitude of 10,500 feet, on the very edge of the vast snow field of the Gietroz glacier. *Saxifraga caesia* I have also encountered on the Val d'Isère side of the Col de Galise at an altitude of nearly 10,000 feet, and on the Val Savaranche side of the Grand Paradis at an altitude of 10,500. At this altitude large colonies of these very high alpine plants may frequently be met with. They grow on shaly ridges and plateaux,

* Dr. Christ, *op. cit.* pp. 316-18.

† *Ibid.* p. 319.

watered by the melting snows and with the least possible amount of humus. It is among these plants that the horticulturist finds the species whose culture costs him his greatest efforts. The conditions under which they grow in their native haunts are so abnormal when compared with those obtaining in lowland gardens that the difficulty experienced in their cultivation is scarcely a matter of surprise.

Before leaving the subject of the physical conditions of the alpine soil in all its variety the rock-plants proper must receive a passing notice. Nothing can be more instructive than to study the plant life growing on some isolated boulder lying in the middle of an alpine pasture. In its cracks and hollows a certain amount of humus will have collected. On the shady side, more especially if wet, *Pinguicula alpina*, *Saxifraga Androsace*, *S. aspera*, and *S. controversa* are among the likely finds. On the sunny side *Campanula pusilla*, *Saxifraga aizoon*, Sedums, *Sempervivum arachnoideum* and *S. montanum*, *Androsace helvetica*, *Draba aizoides*, *Globularia cordifolia*, and, in the Pyrenees, *Saxifraga longifolia* may be taken as representative plants. The study of the vegetation on these boulders is one of the most useful object-lessons which the Alps afford. Nothing more forcibly illustrates how a slight variation in the amount of humus, aspect, and humidity will at once produce a corresponding variation in the type of vegetation.

Most cultivators are aware that attempts have been made at a three-fold division of alpine plants according to the chemical composition of the substratum in which they flourish. This division has taken the following form. Firstly, plants which thrive on a soil rich in lime or 'calcicole' plants. Secondly, plants to which lime is injurious or 'calcifuge' plants, and, lastly, plants which in this respect are indifferent in the matter of soil. Unfortunately, for the enthusiasts for exhaustive classification, further investigation has shown the matter to be far less simple than they originally supposed. One of the very first authorities on the subject, the French botanist, Professor GASTON BONNIER, has made a special study of this question. He prepared lists of calcicole and calcifuge plants in several different districts—for the French Alps, in Dauphiné, for the Austrian Alps, and for the Carpathians—with the result that he found that plants which in some districts were calcicole, in other districts might be distinctly calcifuge and vice versa, and he also found that plants which in one district exhibited a distinct preference for either calcareous soil, or siliceous soil, in other districts were indifferent in the matter of soil. To give but one of many instances. The Edelweiss proved calcifuge in Dauphiné, indifferent in the matter of soil in Austria, and calcicole in the Carpathians. Very few, indeed, were the instances of plants which in all districts alike were uniformly either calcicole or calcifuge. This, I think, conclusively shows that the influence of the presence, or absence, of lime in the soil upon plants is at most local, and depends upon external conditions which vary with the district. It, therefore, by no means follows that a plant which requires one kind of soil in the Alps will exhibit a similar preference in our English gardens. Profound as is the influence of the



FIG. 48. IN THE WOODS AT AROLLA.

Showing Arolla pine (*Pinus Aroolla*) and larch near upper limit of the coniferous zone.

[Photo: R. R. C. Scott,

ibid., p. 68]

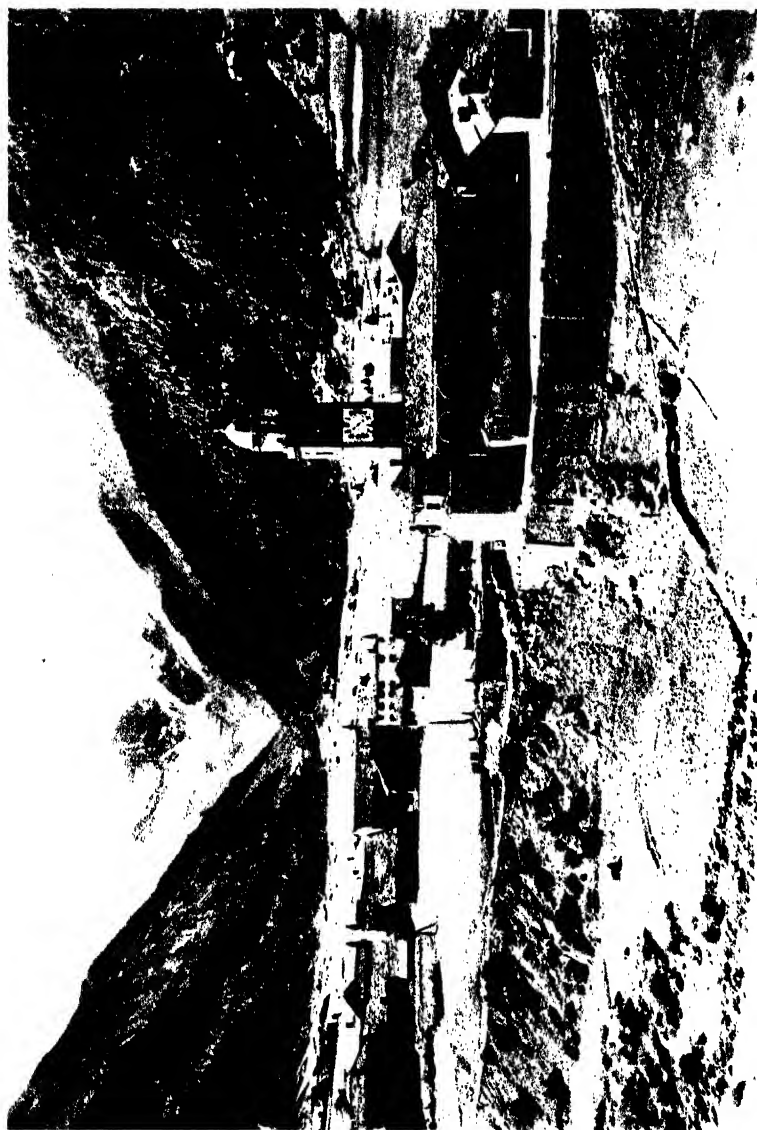


FIG. 49. COCSE AND THE VALMOSIEZ.
[Photo: R. R. C. Vardil.
Showing meadow, coniferous forest, distant alp, glacier, and mountain.

soil upon vegetation and flora locally, all calculations as to a plant's requirements based upon the conditions of soil only are liable to be overthrown by a change in the climatic factors of temperature and atmospheric precipitation.

To turn now to the conditions of the alpine climate. On ascending a mountain, we have, with an increasing rarity of the atmosphere, a fall in temperature, and up to a point an increase in atmospheric precipitation. After that point, which, I believe, in the Alps is generally estimated to be at an altitude of 7500 feet, atmospheric precipitation becomes less as we ascend. "The fall in temperature as altitude increases necessarily causes a reduction in the amount of aqueous vapour in the atmosphere, and the intensity of atmospheric precipitation must, therefore, at a certain altitude be so far diminished that even a greater frequency of precipitation can no longer compensate for the reduction."* Thus increasing altitude is associated with an increase in rainfall, but only up to a certain level, which varies according to the general climatic conditions and local circumstances; above the level at which the maximum rainfall occurs, atmospheric precipitation again rapidly diminishes. Rainfall is generally associated in our minds with a moist atmosphere, but this is not applicable in the case of high altitudes. As we ascend, the diminution of aqueous vapour in the atmosphere proceeds at a much greater pace than does the rarefaction of the atmosphere itself. Thus, taking the aqueous vapour in the atmosphere and the density of the atmosphere itself to be unity at sea level, it has been estimated by Hann that at an altitude of 2000 metres, or, roughly, 6500 feet, the amount of aqueous vapour is represented as .49, and the density of the atmosphere as .78. That is to say that while the density of the atmosphere has decreased by, roughly, 25 per cent., the water vapour in the atmosphere has been practically halved.† "Everything," says Hann, "dries much more rapidly at great altitudes; animals that have been shot, or killed by falling, become mummies without undergoing decay. perspiration evaporates rapidly, the skin becomes hard and dry, and one's thirst increases. The reduced atmospheric pressure renders possible a much more rapid dispersal of aqueous vapour, and consequently accelerates evaporation."‡

With the increasing rarefaction of the air there is also an increase of heat radiation. Objects exposed to the sun's rays become heated more rapidly than in the lowlands, but they also cool with equal rapidity when the sun's rays are withdrawn. Thus the more rarefied the atmosphere the greater the heating by day, and also the cooling by night. At the same time, the ground in the High Alps is relatively much warmer than the air. KERNER has ascertained by numerous observations at different heights in the central Tyrolese Alps that the mean temperature of the soil exceeds that of the air by the following amounts :

* Hann, *Handbuch der Klimatologie*, Bd. 1, p. 299.

† This refers only to the absolute humidity of the atmosphere, the relative humidity being a constantly varying factor.

‡ Hann, *op. cit.* Bd. 1, p. 283.

At a height of 1000 metres about 1°·5 C.					
„	„	1300	„	„	1°·7 C.
„	„	1600	„	„	2°·4 C.
„	„	1900	„	„	3°·0 C.
„	„	2200	„	„	3°·6 C.*

The intensity of the sun's rays, combined with the rarefaction of the atmosphere at high altitudes, causes the soil to absorb heat to a much greater degree than does the air. Moreover, aqueous vapour in the atmosphere also absorbs the sun's rays, and, as we have seen, aqueous vapour in the air diminishes rapidly as we ascend, the intensity of the sun's rays being consequently increased.

Another point in connexion with the question of soil temperature in the Alps is the effect which the great depth of snow has in maintaining the warmth of the soil. KERNER has again made several interesting observations on this subject, and has noted some instances at altitudes approximating to 6000 feet, where the snow varied from four to ten feet in depth, and the soil at one foot below the surface was not during the whole winter cooled below freezing point. On the other hand, where at similar altitudes the snow was not more than 1 foot to 18 inches deep the soil was cooled to $-5^{\circ}\cdot3$ C. (that is, the thermometer stood at about $22^{\circ}\cdot5$ Fahrenheit, or $9^{\circ}\cdot5$ below freezing point).† Not only as regards the radiation of heat is there a difference between the lowland and the mountain climate, but also in the radiation of light. In addition to the increased intensity of the alpine light there is also a difference in quality owing to its greater richness in the blue, violet and ultra-violet rays, and to its greater chemical activity. This increased intensity has been observed by everyone who has any alpine experience, and on the snow fields at altitudes of ten and eleven thousand feet emphasizes itself to the extent of enforcing the employment of smoked glass spectacles as an alternative to snow blindness. The photographic plate is also greatly affected by the alpine light. In addition to the reduced exposure which (relatively to sea level) has to be halved for 5000 feet, and again reduced by one-third for 7500 feet, the employment of ortho-chromatic plates and colour screens becomes a much greater essential of successful photography at high altitudes on account of the increased activity of the blue violet rays. I merely mention this in order to emphasize both the intensity and quality of the alpine light.

I come now to the consideration of the important question as to how far the peculiar characteristics of alpine plants bear relation to those conditions of their environment which I have endeavoured to describe.

I suppose that everyone will admit that the first feature of alpine vegetation to arrest our attention is its dwarf or procumbent habit. Low-growing creeping plants, such as *Salix herbacea*, and *Dryas octopetala*, and cushion plants like *Silene acaulis*, various Saxifrages, Drabas, and

* Kerner, *Natural History of Plants*, English Edition, vol. i. p. 525.

† Kerner, *op. cit.* vol. i. p. 548.

Androsaces abound in the Alps at high altitudes. Moreover, we find that many plants which grow in the lowlands have their closely allied alpine forms differing from them in scarcely any respect excepting habit of growth. *Myosotis alpestris* is practically identical with *Myosotis sylvatica*; the common juniper which grows in this country has its dwarf form in the Alps growing scarcely higher than the ordinary ling. The willow is in the Alps represented by the creeping shrubs, *Salix herbacea* and *S. reticulata*, the *Silenes* by several dwarf forms, of which *Silene acaulis* is particularly remarkable for its close cushion-like habit. Apart from these there are several genera of plants, such as the Androsaces, which are almost exclusively alpine, represented by several species, all of which are exceedingly dwarf in habit.

Many and various are the theories which have been advanced to explain this habit of growth in alpine plants. It has been argued that it is an adaptation to the violence of the alpine storm, and to the pressure of the weight of snow which the plants have to bear in winter. The effect of the wind upon vegetation can be observed in our own country by the sea coast, and it would probably be going too far to say that the fury of the alpine storm has no effect in contributing to the dwarf habit of alpine plants.* It may well have helped, for instance, to make the more erect form of *Juniperus communis*, which we see in this country, impossible for alpine regions, so that we have instead *Juniperus communis nana* as the alpine form. In the same way, the weight of snow may have contributed to a limited degree to the dwarfing of the shrubby plants of the high Alps by breaking down the taller specimens, and thus establishing a selective process in favour of a dwarfer habit.† KERNER, however, emphatically declares that the clinging of woody plants to the ground in high alpine regions must not be regarded either as an adaptation to snow pressure or to storms. "It is," he says, "due rather to the fact that in the high Alps the ground is relatively much warmer than the air, and that plants lying on the soil profit by this higher temperature."‡ To this again it may be answered that many of these creeping woody plants, such as *Salix reticulata* and *Dryas octopetala*, are also indigenous in Arctic regions, where these conditions as to temperature of soil and atmosphere do not obtain. While I do not wish to suggest that these theories should be entirely disregarded as explanations of some of the causes contributing to the dwarf habit of alpine vegetation, I cannot help feeling that the evidence points to the accuracy of the view that it is to the intensity and quality of the alpine light, and to the climatic conditions, that we must look for our explanation of this problem, rather than to the mechanical action of storm and snow pressure, or to the advantage which procumbent plants may derive from relatively higher soil temperature.

Even the most casual observer of the habit of plants cannot fail to notice the very marked effect which the intensity of the illumination

* Schroeter, *op. cit.* p. 664.

† Schroeter, *op. cit.* p. 663.

‡ Kerner, *op. cit.* vol. i. p. 525. Schroeter, *op. cit.* p. 647.

to which they are subject has on their development. SCHIMPER gives the following summary of the result of scientific observation on the subject: "The action of light on plants is either invigorating or restricting, creative or destructive, according to its intensity, and according to the precise physiological function involved. The intensity of illumination at which one or other action commences varies, as in the case of heat, in different species of plants. There are, however, no exact data on the subject.

"Growth in length of stems and roots is at its optimum when light is wholly excluded. Even light of weak intensity exercises a retarding influence in this respect, while light of high intensity brings the process to an absolute standstill. The growth in area of leaves in darkness is very slight, but attains its optimum in light of very moderate intensity. Any further increase in illumination retards, and eventually arrests the



FIG. 50.—GERMANDER (A) EXPOSED TO A LOW TEMPERATURE DURING THE NIGHT AND OUTSIDE IN FULL SUN DURING THE DAY, AND THE SAME SPECIES (B) CULTIVATED UNDER NATURAL CONDITIONS IN THE CLIMATE OF PARIS. (After Bonnier.)

process. The optimum intensity of light for growth in thickness of leaves is considerably higher than for the growth of leaf surface, so that strongly illuminated leaves are small and thick."* In other words, a brilliant illumination exercises a dwarfing influence upon plant life. The length of the axes and internodes is reduced, the leaves decrease in area and increase in thickness. Light of an extreme brilliancy can even possess a destructive influence by the decomposition of chlorophyll. I give the statement by SCHIMPER as representing the result of the general experience of qualified observers. It is, of course, capable of amplification, but I do not think that the research and experiments of more modern authorities will afford evidence to show that as a summary of existing knowledge concerning the influence of light upon vegetation, SCHIMPER's statement is in any respect inaccurate.† The difficulty

* A. F. W. Schimper, *Plant Geography*, English Edition, p. 57

† Leclerc du Sablon, *Traité de Physiologie végétale*, pp. 170-171, 434-449.

rather is that BONNIER's laboratory experiments have gone to show that there are other factors present in the alpine climate which will produce effects in vegetation somewhat similar to those caused by brilliant illumination. By growing in Paris plants of the same species, some of which were cultivated under normal conditions, and others which during the summer were by night subjected to an artificially created low temperature, BONNIER succeeded in checking in the latter the growth in length of stem, and in producing in these specimens, when compared with the former, leaves which were thicker but of smaller area (fig. 50). He also noted in the plants which were subject to the alternation of high and low temperature an increase in the intensity of floral colouring, combined with an increase of the size of the flower. The plants were also of a more vivid green, owing to a more profuse production of chlorophyll.* In certain cases the red colouring matter which can be observed in the foliage of plants growing at high altitudes, and to which has been given the name of "anthocyanin," made its appearance in the leaves and stems of the plants subjected to treatment. Not only has he subjected plants to an artificially created alpine climate, but he established a laboratory in the basement of an electric light station in Paris, and there he proceeded by means of a continuous weak illumination, and by an artificially created low temperature, to reproduce Arctic conditions.† To these conditions he subjected specimens of *Saxifraga oppositifolia* and *Silene acaulis*, which he collected in the Alps before they were uncovered by the snow, with the result that he produced in these specimens the same characteristics which these plants exhibit when growing in Spitzbergen. BONNIER's experiments admirably illustrate the very subtle, yet very powerful influence of varying conditions of illumination and climate upon vegetation. Although there is frequently some difficulty in ascertaining to which factor in the prevailing conditions a modification in the form of vegetation is to be attributed, we cannot fail to be struck by the fact that in the case of the alpine climate all conditions tend in the direction of exercising a dwarfing influence upon plant life. We have the violent storms, the snow pressure, the relatively higher temperature of the soil when compared with that of the air, the intensity of the alpine light, and, lastly, the increased radiation of heat, and the consequent rapid alternation of extremes of temperature for day and night. Authorities may differ as to the relative importance of these factors in their effect upon plant life in alpine regions, but if we take each separately as a contributing cause we have ample to explain the phenomenon presented by the dwarf habit of alpine vegetation.

Most cultivators of alpiners who have tried the experiment of transplanting specimens from the Alps to English gardens, have observed the modifications which these plants undergo. Edelweiss when cultivated in England grows taller, its leaves are larger, and it loses much of that silvery appearance which is its distinctive charm. *Silene acaulis* no longer appears as a close compact green cushion which it

* Bonnier, *Le Monde Végétal*, p. 342.

† Bonnier, *op. cit.* p. 344.

resembles in the Alps, but assumes a more straggling and looser habit, consequent on the elongation of the many tiny stems which form the cushion. These modifications would appear to be due to the less intense light and to the less extreme alternations of high and low temperature prevailing in this country.

The most instructive experiments are, however, those which have been conducted by the two great botanists whom I have already quoted, KERNER and BONNIER. Their experiments consisted in cultivating low-land plants in the alpine climate, establishing, at the same time, control gardens in Vienna and Paris respectively for purposes of comparison. BONNIER experimented in several different gardens: one at Paris 105 feet above sea level; two gardens in the Mont Blanc range at 3460 feet and 7590 feet respectively; and three gardens in the Pyrenees at 2470 feet, 4750 feet and 7920 feet respectively. By using the same soil for the cultivation of his plants in each garden, he endeavoured, as far as possible, to eliminate all variations of conditions save those attributable to the climate. It is not possible here to set out in detail the results of these very complete experiments which BONNIER conducted. For these, reference must be made to his works.* The general results of the observations made were, however, briefly, as follows:—Under the influence of the alpine climate the axes of the plants became shorter and the leaves closer together, and the general growth exhibited a tendency to spread out horizontally. Where the plants were tomentose, or hairy, this characteristic became more strongly developed. The flowers were more intensely coloured, and were often larger. The roots of the plants also acquired a stronger development. These modifications vary in extent in different species. In some cases they were comparatively slight, but in a few extreme instances the plants cultivated in the experimental alpine garden established at the highest altitude only attained one-tenth of the height to which they grew in the control garden in Paris. (Figs. 51 and 52.)

KERNER's experiments were conducted in two gardens, one established at Vienna, and the other on the summit of the Blaser, a mountain in the Tyrol of an altitude of 7243 feet. His results were practically identical with those of BONNIER.† He, however, emphasizes the fact that in some cases he observed a bleaching of the vegetative organs owing to the partial destruction of the chlorophyll, and in other cases that the colour of the foliage was concealed by a strong formation of anthocyanin. KERNER regards the production of anthocyanin by plants at high altitudes as one of the many protective devices which they

* Bonnier, (1) "Cultures expérimentales dans les hautes altitudes." *Comptes rendus de l'Académie des Sciences de Paris*, Tome cxx, 1890; (2) "Influence des hautes altitudes sur les fonctions des végétaux," *Ibid.*; (3) "Étude expérimentale sur l'influence du climat alpin sur la végétation et les fonctions des plantes." *Bulletin de la Société botanique de France*, Tome xxv., 1888; (4) "Études sur la végétation de la vallée de Chamounix et de la chaîne du Mont Blanc." *Revue générale de botanique*, Tome I., 1889; (5) "Recherches expérimentales sur l'adaptation des plantes au climat alpin." *Annales des sciences naturelles*, 7e série, Tome xx., 1895 (6) "Cultures expérimentales dans les Alpes et les Pyrénées," *Revue générale de botanique*, Tome II., 1890.

† Kerner, *op. cit.* vol. xi. pp. 507-511.

adopt in the course of their adaptation to the alpine climate.* On the one hand, he suggests that it exerts a protective influence on chlorophyll preventing its decomposition by excessive illumination, and, on the other hand, he also regards it as probable that where it appears on those parts of the vegetative organs which are less exposed to the light its function is to absorb light and convert it into heat. As concerns its protective influence on chlorophyll, he instances the two cases of the Summer Savory (*Satureia hortensis*) and the common flax (*Linum usitatissimum*).† The former when growing in shady places is green, but when grown in a situation fully exposed to the sun the foliage is coloured dark violet by anthocyanin. The latter, on the other hand, never develops anthocyanin, even though exposed to the full rays of the sun. According to KERNER, both plants require an equal temperature



FIG. 51. — OXEYE DAISY, GROWN ON A MOUNTAIN (A) AND AT SEA LEVEL (B), DRAWN TO THE SAME SCALE. (After G. Bonnier.)

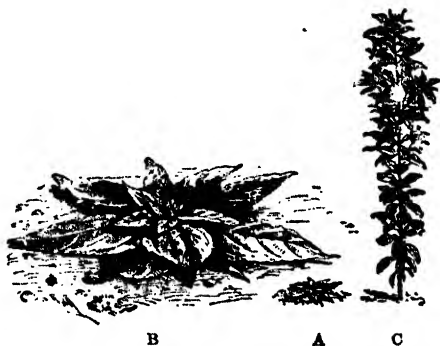


FIG. 52.—JERUSALEM ARTICHOKE GROWN AT AN ALTITUDE OF 2400 M. (A), TO COMPARE WITH THE SAME SPECIES GROWN AT SEA LEVEL (C), DRAWN TO THE SAME SCALE. (B) IS A PLANT FROM THE MOUNTAIN, LESS REDUCED. (After G. Bonnier.)

and an equally long vegetative period, but when cultivated in his experimental Alpine garden on the Blaser the flax turned yellow, and died without flowering, while the Summer Savory developed anthocyanin in extraordinary abundance, flowered, and even produced ripe fruit capable of germinating. Recalling BONNIER's laboratory experiments, it will be remembered that the specimens of plants which he subjected to alternating extremes of temperature also developed anthocyanin where there was no question of a high intensity of illumination. This, however, does not necessarily invalidate KERNER's theories. On the contrary, it may be taken to support the view that, in certain cases, by the development of anthocyanin light is transformed into heat, and thereby compensation is forthcoming for the loss of temperature in a plant's surroundings.

* See also Schroeter, *op. cit.* pp. 646, 647.

† Kerner, *op. cit.* vol. i. p. 393.

The consideration of the significance of the various protective devices adopted by alpine plants presents many difficulties of this kind. One can rarely say with any degree of certainty against which factor of the alpine climate any particular device affords protection. As we have seen, everything in the alpine surroundings and conditions favours transpiration, or the giving off of water vapour from the leaf surface. In spite of the abundance of atmospheric precipitation plants growing on the sun-baked slope of an Alp with, very probably, moraine stuff or scree as a subsoil, and with 50 per cent. less water vapour in the atmosphere than is the case on the lowlands, are necessarily compelled, as a condition of their existence, to adopt measures for the purpose of retaining a supply of moisture in their tissues. Many are the peculiarities of alpine plants to which the discharge of this function has been attributed. Sedums and Sempervivums, which necessarily grow in dry places, have thick, fleshy leaves capable of storing water in their tissues. The Edelweiss, the Anemones, *Senecio incanus*, and the Antennarias are covered with a fine woolly tomentum. *Rhododendron ferrugineum* has minute brown scales on the under side of the leaves, *Saxifraga aizoon*, *S. cotyledon*, and *S. longifolia*, and allied species are thickly encrusted with lime on the edges of the leaves. It is suggested that all these features are devices protective against excess of transpiration. According to KERNER, most of them may also be regarded as a protection against excessive illumination. "Through these structures," he says, "two birds are killed with one stone. All contrivances which keep off too glaring sunbeams, and thereby hinder the destruction of chlorophyll, at the same time diminish transpiration."* It is not, therefore, surprising if alpine plants in the course of their adaptation to the less brilliant light and moister atmosphere of the British Isles undergo a considerable modification in respect of those features of their development which may be regarded as special adaptations to their native climate. Accompanying this modification, there are also the structural changes already referred to in the elongation of the axes, and the increase in area of leaf surface favoured by the less brilliant light and less rapid alternations of extremes of temperature prevailing in the lowland climate. By way of explaining the foregoing the following quotation from a treatise on Plant Physiology by Professor LECLERC DU SABLON, published only this year, may be of assistance, being an up-to-date expression of opinion by a botanist of undoubted qualifications on the problems presented by the peculiarities of alpine vegetation:—" Parmi les caractères des plantes alpines, quelques-uns sont précisément ceux qui sont déterminés par un éclaircissement plus intense, toutes les autres conditions étant égales d'ailleurs. Tels sont l'épaisseur des feuilles, l'importance du tissu en palissade, l'abondance de la chlorophylle, l'épaisseur de la cuticule, le nombre des stomates, le développement des fibres.

" La sécheresse de l'air dans le même sens que l'éclaircissement et

* Kerner, *op. cit.* vol. i. p. 392.



FIG. 53.—THE SUMMIT OF THE ALPINE GARDEN LINNAEA AT BOURG-ST.-PIERRE (VALOIS).



FIG. 54.—ALPINE GARDEN, "LA LINNAEA," NORTH SIDE.

(To face p. 77)

contribue à l'épaississement de la feuille, du tissu en palissade, de la cuticule et à l'augmentation des fibres. C'est également à la sécheresse de l'air qu'il faut attribuer l'abondance des poils chez les plantes alpines.

" L'éclairement intense et la sécheresse de l'air suffisent donc à expliquer tous les caractères des plantes alpines, sauf la faible longueur des tiges et des entrenœuds, et le faible développement du bois. Mais nous avons vu que des derniers caractères sont ceux qui déterminent les alternances d'une température élevée avec une température froide. Or nous savons que, sur les montagnes, les journées d'été, relativement chaudes, succèdent à des nuits très froides; c'est donc là qu'il faut chercher la cause de la faible longueur des tiges et de la réduction des bois. . . . On voit donc, en somme, que tous les caractères de la végétation alpine sont déterminés directement par les conditions extérieures dont l'ensemble constitue le climat alpin, et dont les principales sont: l'éclairement intense; l'air sec, le sol humide et les alternances de température."*

I have purposely left to the end the consideration of the much-debated question of the colour of alpine flowers. Nothing more appeals to and charms the alpine traveller who for the first time sees the meadows and pastures in their full summer glory than the wonderful brilliancy of the floral tints. It would be particularly satisfactory if some explanation were forthcoming to account for the more vivid colours of the alpine flora. Unfortunately, the problem at present lies mainly in the realm of conjecture and speculation. I have, myself, had many opportunities of observing the intense floral colouring of alpine specimens when compared with one of the same species grown in lowlands. The common willow herb, *Epilobium angustifolium*, grows almost as freely at Saas Fee in the Canton Valais at an altitude of 5500 feet, as it does in my own garden at Chislehurst, where it is occasionally allowed to exist as a rather attractive, if somewhat exuberant, weed. It is, as we should expect, not so tall at Saas Fee, but its colour is much more brilliant. Again, I had for many years grown *Aquilegia pyrenaica* in my rockery, but I never realized what a beautiful flower it really was until I found it by the roadside, close to the Col de Portalet in the Pyrenees, at an altitude of about 7500 feet. The colour just made all the difference. KERNER and BONNIER have both remarked on the brilliancy of floral colouring of their alpine cultures of lowland plants, and KERNER has pointed out that the flowers of some species, which were pure white when cultivated in his control garden in Vienna, produced petals tinged with pink when cultivated in the alpine garden on the summit of the Blaser. He attributes this to a suffusion of anthocyanin, and suggests the same cause as the explanation of the brilliancy of floral colouring of many plants growing at high altitudes.† SACHS

* Leclerc du Sablon, *op. cit.* p. 489.

† Kerner, *op. cit.* vol. xi. p. 551.

asserts that the ultra-violet rays favour floral development.* Others allege the light intensity alone as the cause favouring the production of brilliantly coloured flowers. Certainly the fact that plants which are forced into flower by artificial means at a time of the year when the light is less intense than it would be at their normal flowering season, produce relatively less brilliantly coloured flowers, seems to lend a certain support to the view that the intensity of floral colouring depends on the brilliancy of illumination. It is also suggested that the vivid colouring of the flowers of alpine plants is due to a special adaptation for the purpose of attracting insects, the vegetative period at high altitudes being short, and the necessity for an early fertilization correspondingly urgent. It would seem, however, not to be possible to assign this as the cause for the phenomenon under discussion without, at the same time, implying the existence of a selective process in favour of the plants producing the more brilliantly coloured flowers. If the greater intensity of floral colouring of alpine plants is due to a selective process, it is difficult to understand that it should not have become hereditary, yet the modification in the intensity of colour which the flowers, produced by specimens transplanted from the Alps to lowland gardens, undoubtedly undergo, certainly seems to militate against this being the case, while the increase in intensity of floral colouring which lowland plants acquire when transplanted to high altitudes, still further seems to negative the theory that brilliancy of floral colouring in alpinism is due to a selective process. The conflicting theories of botanists may well confuse the layman, but we may still look forward with interest to the time when further research and experiment shall have brought us a stage nearer the elucidation of the fascinating but difficult problem.†

Viewing as a whole the conditions of the alpine climate and surroundings, and their wide divergence in almost every respect from those obtaining in the moister atmosphere, and under the dull skies of our own sea-girt island, we may well marvel at the success which attends our efforts in cultivating alpinism in our own gardens. True it is that there are some species which not even the efforts of our ablest cultivators can bring to the full glory of their development. *Androsace glacialis*, *Eritrichium nanum*, and some of the Gentians which come from close to the everlasting snows, are among the most unresponsive to treatment. The wonder is that the recalcitrants are so few. We can, by means of green-houses and damping down, produce a very fair imitation of a moist, tropical climate, but the reproduction of the alpine

* Sachs, "Ueber die Wirkung der ultra-violetten Strahlen auf die Blütenbildung." *Arbeiten aus dem botanischen Institut zu Würzburg*, Bd. 111, 1884 (*Ges. Abhandl.* 1, p. 354).

† (a) Schimper, *op. cit.* p. 706, *et. seq.*; (b) Dodel-Port, A. "Farben, Pracht und Grösse der Alpen Blumen," *Kosmos*, Bd. 1, 1879; (c) Heekel, Ed., "Sur l'intensité du coloris et les dimensions considérables des fleurs aux hautes altitudes," *Bulletin de la Société botanique de France*, Tome xxx., 1883; (d) Keller, R., "Die Blüten Alpiner Pflanzen, ihre Grösse und Farbenintensität" öffentliche Vorlage, gehalten in der Schweiz, Bd. ix., 1887; (e) Sargnon, "Causes du vif coloris que présentent les fleurs des hautes sommités alpines." *Annales de la Société botanique de Lyon*, Tome vii., 1879.

climate lies entirely beyond our control. We may study the conditions of soil under which the individual species of alpine plants grow in their native haunts, and we may, by careful experiment, learn how best to treat them in this respect in our own gardens. For the rest, we must rely on the capacity which most alpine plants exhibit for adaptation to new surroundings, and even if, in the course of undergoing this adaptation, they lose some of the beauty which is theirs when growing under their native skies, they are still well worthy of the care which we bestow upon their cultivation.

[Figures 50, 51, and 52 are reproduced by kind permission of Prof. Bonnier and MM. Flammarion.]

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ALPINE GARDENS.

By MONSIEUR H. CORREVON, F.R.H.S.

[Read May 9, 1911.]

THE cultivation of mountain plants, and more especially those of alpine growth, has been in favour on the Continent for more than sixty years, and still longer in England. The Genevan botanist, BOISSIER, began about the year 1850 to construct in his interesting and rare garden at Valleyres at the foot of the Jura rockwork in which he at first cultivated plants he had brought from Spain and the East, and afterwards those from the Alps. His garden soon became celebrated and visitors came to it from all parts. It gave to others the impulse to go and do likewise, and that is how I, being a neighbour of BOISSIER, became initiated in my childhood into the cultivation of plants in rockeries.

I do not know when or how this taste first arose in England; but even in the sixteenth century, according to Paxton's *Botanical Dictionary*, certain types had been brought from the Alps and cultivated, such as *Primula Auricula*, *Gentiana acaulis*, and *G. lutea*.

The idea of cultivating these plants in rockwork is reasonable enough, and I myself have recommended it in my first volume, *Alpine Plants*, published in 1884. Nevertheless, it is neither æsthetic nor natural. If, on the one hand, the species belonging to rocks (saxatile plants) need fissures in stones for their development, on the other there is a multitude of terrestrial plants, those of alpine fields or meadows, which it is ridiculous to treat in this manner. That is why we have established alpine gardens. Instead of immense constructions "A la Mont Blanc," we prefer nowadays the establishment of small rockeries scattered about in the grass or on a natural slope. The supreme art of gardening consists in grouping artistically open-air plants in the midst of verdure and green sward, and in arranging them with a view to producing pictures which imitate natural scenery.

It is moreover in this spirit that the great English artists have worked, to whom belong the most beautiful artificial alpine gardens that I have ever seen, those of Warley, Friar Park, Leonardslee, South Lodge, and Batsford. I can repeat here what I have said for more than forty years, which is that in England is best understood the interest that attends the cultivation of mountain plants and that in this country it has been pushed most forward, at any rate in the gardens of amateurs. As for botanic gardens, there are certainly no collections in the world which can rival those of Kew and Edinburgh, although the alpine botanic gardens that have been constructed in the Swiss mountains offer perhaps more brilliancy and more attractiveness because of the



FIG. 55.—NARCISSUS FIELDS AT CHÂTEAU D'ORN.

[Photo: Capt. Mackenzie.]

(To face p. 80)



FIG. 56.—A WALL GARDEN BY M. H. CORREVON, GENEVA. [*Photo: Miss Willmet, F.M.H.*]

setting which surrounds them, and by the fact that under the conditions in which they are placed the plants prosper in a special manner.

And outside these great collections and the well-known beautiful classic gardens, there are thousands of growers of mountain plants, whether on rocks on the ground only, or in flower beds, who cultivate them lovingly and often with great success. That is why I consider this country as the most advanced in the cultivation of mountain plants, as it is in almost all branches of horticulture. If we have any superiority in Switzerland it is in mural cultivation and alpine gardening. That is why I thought a rapid sketch of this subject would interest my readers.

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Let us first take some of the English alpine gardens—those that I have had an opportunity of visiting. Warley is without doubt one of the best known and most admired. Botanists, gardeners, and artists look to this garden as to a place of desirable pilgrimage. It has the advantage of an excellent climate, and, though only twenty-four miles from London, is completely free from its foul fogs and smoke. Here, sheltered by evergreen oaks and the Spanish chestnuts plants by John Evelyn, are plants from every part of the temperate world. The flowers from the Cape and from New Zealand are side by side with those of the highest Alps and of Arctic and Antarctic regions. Everything is well grouped and admirably and artistically combined to form wonderful pictures.

From earliest spring the wide lawns are carpeted with myriads of flowers and particularly with bulbous plants.

There is at Warley a water garden, a woodland garden, a fruit garden, a botanic garden, a bulb garden, an herbaceous garden, and even a kitchen garden, every one of which is a picture in itself and has its special value. But the alpine garden in itself and for itself has made the great reputation of Warley Place, and indeed justly. It is a very fine work, bearing on the face of it, even deeper than all the rest, the stamp of the artist who conceived it. It is not in the true sense of the word a garden, but a valley hollowed out in the mountain, and in this valley is shown a synthesis of the whole plan of mountainous regions. At the bottom of the valley runs a little stream; it murmurs a wild and plaintive song. On finding oneself hidden among the masses of flowers, one feels as if transported into the midst of a great landscape of Scotland or the Alps of Switzerland. The space occupied is over an acre, and the valley runs from north-west to south-east. At the lower end is a miniature lake that receives the stream after it has passed through a series of picturesque gorges. This garden is partly formed of calcareous rock for the benefit of plants requiring lime, and partly of granite for those that dislike it. It was made barely twenty years ago and looks perfectly natural.

The alpine garden at Friar Park, belonging to SIR FRANK CRISP, is one of the greatest things I have ever seen in its way. It lies open to the sun, in the mild and equable climate of Henley, by the cool

wooded banks of the Thames, and covers an area of more than five acres. It is a fine and big construction, midway between a rockery and alpine garden. It recalls in its varied views and outlines the great rocky masses of the Pennine Alps with a semblance of the bold peak of the Matterhorn dominating the whole.

The great work has been carried out by SIR FRANK himself with the intelligent collaboration of the head-gardener of Friar Park, Mr. KNOWLES. Begun about fourteen years ago, this rock-garden has grown into a remarkably faithful portrayal of high alpine landscape. The picture—for it is a picture—owes its perfection to a right comprehension of proportion and of the artistic values of the mountain heights. The dimensions of the plant masses, as well as those of the trees which surround the whole, are in perfect harmony with the nature of the stone and its lines of cleavage, while the scale of the whole composition is admirably proportioned. It is just these qualities of appreciation of scale and proportion that are so rarely seen in such undertakings, however large their extent may be. Inside these boundaries everything is so well adapted to the alpine flora that one can see there the most varied plants flowering in perfection. There one sees most heterogeneous specimens, from the *Soldanella*, *Gentiana verna*, and *Androsace glacialis* of our Alps to the superb *Schizocodon soldanelloides* of Japan. Side by side open the suave corollas of *Daphne Blagayana* (the most beautiful specimen I have ever seen) and the other species, *collina alpina*, *striata*, *rupestris*, *Genkwa*, and *odora*; the pansies of the Alps and the Pyrenees; the asters and the gentians of all the boreal hemisphere; the delicate *Omphalodes Luciliæ* by the side of the brilliant *Zauschneria* of California; the Rhododendrons of all the zones; the rock Primulas, the Androsaces—in short all that belong to the mountains of the whole world and to the Arctic and Antarctic. The Orchids growing on the open ground are beside the hardy Cacti, the pines, low-growing and short, scarcely attaining a few inches in height, cover the blocks of stone which hide in their fissures the Sempervivums or the most delicate Saxifrages. And the water which flows from the heights of the Matterhorn sings the same sweet mountain cantilena, so that we are able to imagine we, though here, are far, far away and lost in the high mountains.

The stone used is what is known in England as millstone grit. It occurs in great blocks that often measure several yards across. The weight of the stone used exceeds 10,000 tons; it comes from the neighbourhood of Bradford.

LORD HENRY BENTINCK's garden at Underley Hall is well known for its beauty and magnificence. I saw it one autumn five years ago and again last year in the pride of the springtime. It is a real wonder in the sense of "wild garden," and a creation of which I cannot sufficiently describe the beauty and grandeur. Situated near Kirkby Lonsdale, it extends over four acres, and to reach it one crosses a fairly wide river in a ferry-boat. This garden stretches from the river-side to the bottom of a wood of time-honoured trees. Though

begun scarcely fifteen years ago, it already has the aspect of a natural landscape. The most varied forms set off one another reciprocally. Here are the gigantic *Gunnera scabra* alternating with delicate ferns or with shrubs of fine foliage, such as the maples of Japan or the most delicate varieties of conifers; elsewhere there are some enormous *Saxifraga pellala*, *Heracleums*, and *Rheums*, which set off the elegant clusters of the Fuchsias, the Heaths, the *Monardas*, or the *Columbines*. The glaucous or silver leaves of the *Onopordons*, of the *Artichokes*, and the *Cardoons* (*Cynara Cardunculus*), show off the flowers of the sea-hollies (*Eryngium alpinum*, *amethystinum*, *Bourgati*, *giganteum*, *maritimum*, *planum*) brought here from all parts of the ancient world, and place themselves, with a noble pride, beside their American congeners so poorly endowed with either elegance or colour. Then there is the little alpine flora in the small rockeries bordering the sylvan paths—the *Edelweiss*, the various *Gentians*, the *Primroses*, *Ranunculi*, *Ranondias*, *Soldanellas*, *Saxifrages*, *Myosotis*, *Cortusas*, &c., a brilliant and sparkling company in this vast Paradise of flowers, and all contributing to it their vivid and pure note. LORD HENRY and LADY BENTINCK take a personal interest in this garden, which has been created by the artistic help of the head-gardener, who bears the predestinated name of MILLER. The garden has this special point, that it is an intermediate form of gardening between the rock- and the wood-garden.

South Lodge, near Horsham, is one of the best rock-gardens I have ever seen. Surrounded by a large and rich collection of shrubs (I believe that all the shrubs of the world are there) artistically grouped and framed in by dark green trees, the plants are disposed with an exquisite taste, their colours being so combined that one gives value to another. When I saw it the *Rhododendrons* and *Azaleas* were beautiful; herbaceous and alpine plants are alternated with the shrubs, so that the whole picture is full of life and colour.

In the rock-garden at South Lodge everything seems healthy and well grown. I saw there the best of alpine plants growing side by side with the children of the New Zealand or the Chilian Alps, of Japan, the Orient, and the Himalaya. *Myosotidium nobile* was splendid, and near it bloomed the deep orange flower of the American *Lithospermum canescens*. I admired immensely, as I saw it drooping from a higher rock, that ideal and superb flower called *Crinodendron Hookeri*, which my late friend, the REV. H. EWBANK, grew so well in his Ryde Paradise; *Linnaea borealis*, the different kinds of *Ranondias*, all the beautiful species of *Meconopsis*, *Rhododendron kamschaticum*, everything was gay and bright, and even numbers of terrestrial orchids, generally not of easy cultivation in England.

Leonardslee, just opposite to South Lodge, is such a big place that I call it rather a country than a garden. The rock-garden itself is only a corner of that immense, incommensurable park, which is quarter a botanic garden, quarter a zoological one, quarter an artistic picture, and quarter a wild wood garden. *Solanum crispum* here is

quite a tree; the Camellias, Azaleas, and Rhododendrons form a kind of wood, and one can walk in their shade.

In the rock-garden I saw, long years ago, the best *Atragene alpina alba* I have ever seen; it was hanging from a high rock and covered with its large pure white flowers. *Philesia buxifolia* is there in beautiful state and flowers abundantly, as it does, too, in the Botanic Garden of Edinburgh, where everything seems to grow well. I am indeed jealous over this Chilian plant, which will not flower at Flôraire, and which I saw grown like a weed by Messrs. CUNNINGHAM and FRASER at Edinburgh. There are also some creeping spruces here which are really a marvel.

I have said the English climate suits alpine plants better than our continental climate in Switzerland; and I rest this statement, so to say, upon the comparisons I have been able to establish since I first visited England—that is to say, since 1886. Nevertheless, in what concerns those of the highest regions, the tufted and thick-set dwarfs (*Eritrichiums*, *Androsaces*, certain *Primulas*, *Campanulas*, *Gentians*, and *Saxifrages*), the advantage is on our side. And yet I must acknowledge that I have seen alpine plants most delicate and difficult to cultivate succeed perfectly in certain English gardens. Mrs. SAUNDERS, at Wennington Hall (Lancaster), cultivates in a limit little adapted, for it is within the boundaries of a kitchen garden, treasures that few cultivators of alpenes have ever succeeded in growing. I have seen there, flowering wonderfully, the following species: *Eritrichium nanum* (grown from seeds), *Aquilegia alpina*, *Androsace glacialis*, *A. helvetica*, *A. pubescens*, *A. carnea*, *A. villosa*, *Phyteuma hemisphaericum*, *Azalea procumbens*, *Ranunculus alpestris* and *R. parnassifolius*, *Anemone alpina*, *A. sulfurea* and *A. narcissiflora*, *Arnica montana*, *Trifolium alpinum*, every sort of *Gentians*, *Primulas*, *Soldanellas*, *Campanulas*, *Saxifrages*, *Drabas*, &c.

Mr. W. H. ST. QUINTIN, of Rillington, in Yorkshire, grows every kind of rare thing, too, with an equal success. *Aquilegia alpina* flowers freely with him, and so does *Pyrola uniflora*. He grows beautifully, too, *Eritrichium* (from seeds), as did my late friend the HON. CHARLES ELLIS, of Frensham Hall, and so, I think, does Mr. H. BURROUGHS, of Stamford. Mr. ST. QUINTIN succeeds in growing *Eritrichiums* from seeds ripened in his garden!

I cannot speak of the Edinburgh Botanic Garden otherwise than as a terrestrial Paradise for alpine plant lovers; neither can I express adequately here the pleasure I had in a visit I paid last year to Professor BALFOUR and his rockeries. The collection of rare alpenes which are grown at Edinburgh is so great and these plants are so healthy that I cannot but repeat what I wrote last year in the *Gardeners' Chronicle*: "Although I do not cultivate the sin of jealousy, I greatly envy the success which has attended some English and Scotch gardeners in their cultivation of choice alpenes."

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Now let me ask you to look for a moment at the alpine gardens



FIG. 57.—WALL GARDEN BY M. H. CORREYON, GENEVA.

Photo: Mr. Island.

(To face p. 84)



FIG. 58.—WALL GARDEN AT FLORAIRE.

in which we take the most pride in our country—the *Linnaea* and *Rambertia*—which leads me on to saying a few words about our wall-gardens.

The garden of the *Linnaea* is situated at Bourg St. Pierre in the Valais, about three hours below the Hospice of the Grand St. Bernard, at an altitude of 5400 feet. It covers a rounded rocky mound about 180 feet high on three sides with a superficial area of four acres. We bought the ground in 1888, thanks partly to donations from members of the English Alpine Club, and more especially to Professor ROMANES, of Oxford. There were established some forty rockeries, constructed very inæsthetically and with the most deplorable artistic effect, for they were made by the keeper of the garden, a simple Valaisan whom we found and who cultivates it when he has a moment of time. We have no regular help except an annual grant of £20 from the Swiss Government, which goes to pay the said keeper. We can do nothing artistic, and we have to content ourselves with what we have at hand. But Nature herself works for us and with us, and there we have lively reasons for encouragement and joy. In a rockery near the summit, looking to the north, we have thousands and thousands of *Papaver alpinum* (the true Alpine Poppy), decked out with the most delicate tints. We keep them carefully separate from the Iceland Poppy, which is on the western incline, 500 feet farther on and cut off by the summit even of the garden, so that we have every opportunity of preserving the pure race of the *Papaver alpinum*. It has escaped from its rockery and ornaments all our pathways and even a slope on the western side, and more than a mile away the bright and sparkling colours of the millions of little Alpine Poppies are distinctly visible.

Another triumph of the *Linnaea* is the Alpine Sea-Holly (*Eryngium alpinum*), which has there become superb and reproduces itself spontaneously; its large involucre, its stalks, and even its upper leaves become an intense violet blue in August and September. The delightful *Dianthus alpinus* and *D. neglectus* are also quite "at home" there, and the Edelweiss is everywhere. *Epilobium latifolium*, a beautifully fine plant, was sent me in 1890 from the gardens of Belvoir Castle, and what we planted in the Willmott rockery has invaded all the north of this rockery, situated at the summit of the garden, and grows there wonderfully, eliciting cries of admiration from all visitors.

Heuchera sanguinea succeeds in our rockeries admirably, and the tint of its rosy flowers is so gorgeous that it produces an absolutely fantastic effect. In the rockery of the Balkans that the King of Bulgaria has had built, and which bears his name, we cultivate a complete selection of Balkanic plants that his Majesty sent from Sofia. *Campanula Raineri*, *Zoysii*, *Allionii* and *excisa* invade certain rocks to such an extent that we have to abandon them entirely. The Primulas also do wonderfully up there, but we cannot often enjoy them, for they flower in May and June at a time at which it is difficult to go and admire them.

As a rule the flora of elevated regions, especially that which fears

the presence of lime, does wonderfully well at the Linnaea, while the lime-loving species planted there are not so brilliant. That is why we established in 1895 at the summit of the Rochers de Naye (6000 feet high) another rock-garden of pure limestone only, on which we cultivate with success the plants of the highest points, and more especially of the limestone mountains. There we own sixteen acres, which extend over the two slopes of the mountain, north and south, from the top of the Rochers de Naye to scarcely ten minutes from the station of the railway leading from Territet-Montreux and the Hotel de Naye. This explains the great popularity of the Rambertia and why we have from 1100 to 1200 visitors every summer, although up there the summer lasts scarcely more than two and a-half months.

At the Rambertia the slope is much steeper than at the Linnaea; the view is more extensive, comprising a part of the alpine chain from Mont Blanc to the Jungfrau. The Alpine and Iceland Poppies are there mixed, and have given birth to a crowd of divers forms and tints. *Geranium argenteum* and *G. cinereum* reproduce themselves spontaneously on every rock, and the flower of the Edelweiss there attains considerable size and purity of down. But what prospers above everything are *Campanula pulla* and *Linaria pallida*, which form veritable carpets invading all our rocks.

The University of Lausanne has established at Les Plans, above Bex (3600 feet), a little alpine garden which serves for the study of alpine flora by the students at Lausanne. This garden is named *La Thomasia*.

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But it is in wall-culture that we Swiss have perhaps the superiority over other peoples. In 1860 BOISSIER made his famous wall at Valleyres, in which he cultivated *Saxifraga longifolia*, *S. florulenta*, *S. media*, *S. tombeanensis*, *S. Vendelli*, *S. cuesia*, *S. retusa*, &c., side by side with *Haberlea rhodopensis*, *Alyssum pyrenaicum*, *Valeriana longiflora* and the rock Primulas.

We established in 1884 in our garden at Plainpalais a wall of tufa stones which we garnished with saxatile plants of all kinds and which was soon well covered. There flourished *Phyteuma comosum* and *P. humile*, *Campanula Raineri*, *C. excisa*, *C. petraea*, *C. velutina*, *C. Wanneri*, *C. macrorrhiza*, the Primulas *pedemontana* and *Portae*, *Androsace helvetica*, *A. tomentosa*, *A. ciliata*, *A. vitaliana*, *A. pubescens* and *A. glacialis*, every variety of Saxifrage, the Hedraeanthus, *Omphalodes Luciliae*, &c.

When I transported my plants to Floraire I built there a wall with two sides, one looking to the south, the other to the north, and introduced into all the crevices between the stones all the saxatile flowers capable of succeeding in our climate, and I had very satisfactory results with all the Saxifrages of the groups Kabschia, Funizoonia and Dactyloides, with the Hedraeanthus, Androsaces, Dianthus, Silenes, Drabas, *Petrocallis*, Campanulas, *Antirrhinum Asarina*, *A. glutinosum*, and *A. sempervirens*, *Valeriana saxatilis* and *longiflora*. *Aethionemas*

there are superb, and the *Acantholimons*, which I have placed on the top of the wall, form considerable clumps which, especially *Acantholimon venustum*, are covered with a carpet of bright rose in the summer-time. On the northern side we have planted *Saxifraga florulenta*, *S. pedemontana*, *S. retusa*, *S. cuneata*, *S. corbariensis*, &c. *Morisia hypogaea* and *Moeckringia sedoides*, *Ramondias*, *Ranunculus alpestris*, and *R. bilobus* and *Primulas*. *Primula Allionii* is there absolutely covered with flowers from the beginning of March, and succeeds wonderfully.

These walls are so vivid, so brilliant even, that we have met with several imitators, and in our country at least we begin to take a deep interest in wall-cultivation. The town of Geneva has caused to be planted several hundred wall plants in what now remains to us of the old fortifications below the Promenade St. Antoine, and these plants are healthy and taking root there. The companies of the mountain railways (Territet-Glyon; Vevey-Pèlerin) have planted in the walls which border their lines every kind of saxatile flora, and from the end of January one can admire on the walls of the suburbs of Vevey and Montreux the deep violet clumps of the *Aubrietia*, whose flowers have so spread that they form coloured cushions of sometimes from 1 to 2 feet in diameter. Later on will come the *Centranthus* of three colours, *Corydalis lutea*, *Campanulas*, *Saponaria ocymoides*, and a hundred other brilliant flowers. For in this perpendicular position the most delicate plants succeed beyond all expectation. But it is necessary that the wall be perpendicular or the result will be poor. The less space between the stones, the more trouble the plant has in finding subsistence, the more brilliant and rich is its efflorescence.

I know several of these gardens in England, and I can affirm that the plants that have been introduced there have succeeded admirably, even such delicate species as the *Androsaces*, *Onthalodes* and *Campanula Raineri*.

THE ORIGIN AND STRUCTURE OF AQUATIC FLOWERING PLANTS.

BY THE REV PROF. G. HENSLow, M.A., F.L.S., V.M.H., &c.

[Read April 11, 1911.]

General Inferences.—There are good reasons for believing all existing aquatic flowering plants to have descended from terrestrial species. First, because botany has of late years greatly supported the hypothesis that Dicotyledons are descended from terrestrial Gymnosperms*; secondly, that Monocotyledons were derived from aquatic Dicotyledons; and lastly, because most of the genera and species of the families to which aquatic plants belong are, as a rule, terrestrial. Thus the Primrose family is terrestrial, but one genus, *Hottonia*, is aquatic. Buttercups and other genera of the same family are land plants; but the many forms of the Water Crowfoot are aquatic. Rarely a whole family is aquatic, as the Water-lilies (*Nymphaeaceae*); but this family is allied to *Ranunculaceae* through the genus *Cabomba* with submerged dissected leaves.

Of the six external factors which chiefly affect the life of plants—viz. water, temperature, soil, air, light, and other organisms—the difference in degree of the amounts of water and heat are by far the most important in affecting the forms and internal structures of plants. Thus a hot, moist, tropical forest is totally different from a dry thorn-forest or savannah, though the air, light, and soil may be more or less alike. Similarly, in temperate regions, an amphibious plant or an aquatic one with submerged leaves when growing on dry ground is very different from the same species growing in its normal habitat.

Turning to the causes of structural changes, observations and experiments have conclusively proved that the external conditions are the actual causes of the new structures which appear when the seeds of a species accustomed to one kind of locality grow up in a very different environment, as in changing from dry to wet, from hot to cold, conditions, or vice versa, &c. The changes are due to a "responsive" power residing in the *life* of the plant, which *directs* the forces acting in and on the molecules of matter, which build up tissues different from those of the parent plant in order to put the offspring in adaptation to its new conditions of life.

Such is the real basis of the whole evolutionary process.

How did terrestrial plants become aquatic? It is probable that they passed through the intermediate stage of becoming marsh plants. Thus *Ranunculus Lingua* and *R. Flammula*, our two spearworts, have narrow, pointed leaves, as if they had grown thickly on probably very

* "The Xerophytic Characters of Coal-plants," *Quart. Journal Geol. Soc.*, vol. lxiii. (1907) p. 282.

wet land; for that type of leaf is characteristic of crowded foliage, as seen in thrift, pinks, &c., and it occurs in many tufted plants, as *Plantago lanceolata*, and especially if aquatic, as *Littorella lacustris*, &c. Then, when the marsh became a pool, *Ranunculus Lingua* was submerged, or else it bore floating leaves; for these two species put forth quite different forms under these conditions, the blade of the submerged leaf being oblong, broad, and blunt at the end; while the floating form is more heart-shaped and rounded, like that of the water-lily, but small. Both these species are now amphibious; but that type of submerged leaf is exceptional among Dicotyledons.

The general effect of an excess of water on the anatomical structure of plants is *degeneracy*. Yet, while aquatic plants have many of their organs and much of their internal tissues more or less arrested—*i.e.* as compared with those of land plants—the plant thereby puts itself in adaptation to a submerged existence, inasmuch as many tissues, which cease to be produced, are no longer required. As a result, large hollow spaces are formed between the cells for the accumulation of air, partly to sustain vital functions and partly to act as floats.

Contrasts between the Effects of Moisture and Drought.—The first superficial and readily observable effect of a damp atmosphere is the greater or less absence of hair on the stem and leaves. Thus, the silver-weed (*Potentilla anserina*), if growing in a dry, sunny situation, as by a roadside, has *both* sides of the leaf densely covered with silky hairs, giving a silvery appearance, hence its name; but in a damp, shady lane the *upper* side is mostly destitute of hair, so that it acquires a dark green colour. Similarly all the species of rush (*Juncus*) are glabrous, and grow in water or damp places; while the woodrush (*Luzula*) is hairy.

Different species or varieties of the same genus may show similar differences. Thus the Forget-me-not (*Myosotis palustris*) and its ally *M. caespitosa*, being aquatic or marsh plants, are very scantily supplied with *adpressed* hairs, while *M. sylvestica*, a land plant which is often cultivated, has numerous *spreading* hairs. So, too, buttercups are hairy plants, but the water crowfoot is quite hairless.*

The Degenerative Effects of Water upon Roots.—This is well seen in the germination of a seed, for the radicle is at once arrested if it penetrate water, as may be observed by placing some seeds of dicotyledonous plants (cress, peas, &c.) on a piece of net just touching the surface of the water; as soon as the radicle penetrates the water it ceases to grow, but adventitious roots then arise from the stem or hypocotyl above the apex. These lateral roots formed for use in water cannot be used by the plant if transferred to land. Several aquatic plants are entirely rootless in a full-grown state, as the Hornwort (*Ceratophyllum*),[†] Bladder-wort (*Utricularia*), &c.

Other characteristic features of aquatic roots are seen in their

* If *Ranunculus repens* happens to grow more or less by water, the hairs become *adpressed*. They are peculiar in having a compound cellular base (as in *Boraginacæ*), probably for absorbing water as dew in dry situations.

anatomical structure. The roots of flowering plants are provided with root-caps which protect the delicate tissue of the growing apex within them growing through the soil. In all Dicotyledons the formative tissue is in one mass, *i.e.* common to the root-cap (which is continually renewed from below as the outer cells wear off) and to the root-end. Water, however, causes a separation, so that each becomes provided with its own active tissue. The root-cap thus becomes independent of the root-tip. Consequently if a water-plant, say the water Dropwort (*Oenanthe*), be pulled out of the mud, the root-caps will be left behind; the roots then look as if truncated. It is quite otherwise with land plants, unless they have been formerly aquatics, as the Lesser Celandine.

The internal structure of the root of an aquatic plant shows unmistakable degeneracy. If, for instance, the roots be compared of the same amphibious species, one plant growing on land and the other in water, *e.g.* the Bur-Marigold (*Bidens*), the following details will be seen. The root of the land plant has the usual well-formed tap-root and rootlets, with a thick zone of cortical tissue. Several strong groups of woody bundles or xylem are arranged in a circle with pith in the middle; whereas in the aquatic root large air-spaces occur in the cortex and pith, while the wood is very much reduced in quantity. In some much reduced aquatic plants far greater degeneration takes place. Thus in *Hydrocleys Humboldtii* the wood is reduced to four vessels and the phloem to the same number; while in *Najas* and *Lemna* there are none at all of either kind, a large lacuna occupying the centre of the root.

Pneumatophores, Aerenchyma and Lacunæ of Aquatic and Marsh Plants.—As the absorption of oxygen for respiration of the roots is of vital importance to herbs and trees, they are provided with special structures. The first are known as pneumatophores or "root-knees," which come above the marshy ground to store up air in the hollow interior. The deciduous Cypress (*Taxodium distichum*) is a well-known example; but when it grows in a dry or sandy soil they are not formed. Herbs also have aerenchyma, or cellular tissue with lacunæ for storing air. The pith of a rush is a familiar instance, in which the individual cells are like stars, their ray-tips only uniting.

The Marsh Samphire (*Salicornia herbacea*) of our salt-marshes has a loose cellular coat over the upper part of the root.

Degeneracy of the Stems of Aquatic Trees and Herbs.—Experiments upon the comparative effects of a very dry, a very moist, and a normal atmosphere respectively on ordinary woody stems proved that the proportion of wood to pith increased in dry air, but decreased in moist conditions of the air. In some cases the complete cylinder of wood of a year's growth in an ordinary tree is entirely broken up into a number of isolated "strands" of woody bundles resembling that of any garden annual, or a flowerstalk of a primrose, &c.*

* See Eberhart's experiments described in *Ann. des Sci. Nat.* t. xviii. p. 61. 1903.

A similar separation, coupled with dislocation, takes place in submerged stems, such as the rhizome of a water-lily. The whole becomes a mass of cellular tissue having numerous scattered fibro-vascular bundles dispersed through it. It thus resembles the stem of a palm. Comparing the rhizome of the Lotus (*Nelumbium*) with that of the water-lily of the same family, we seem to see "degrees of dispersion," so to say, for the strands, though all separate, are more regularly arranged concentrically in the former than in the latter.

The aerial stems and petioles of several moisture-loving plants have a similar structure though growing in air, as the flower-stem of *Anemone rivularis*, *Callitha palustris*, *Podophyllum peltatum*, *Hydrastis canadensis*, and the leaf-stalks of the edible rhubarb.

It may be added that the formative tissue, *cambium*, of a timber tree is absent in the isolated strands, or at most only the merest traces of it are left in Monocotyledons.

The Degenerative Effects of Water upon Leaves.—Perhaps the most obvious effect of water is to be seen in the foliage. There are two principal types of submerged leaves, the dissected and the ribbon-like. When a land dicotyledonous plant, with a netted-veined, fibro-vascular system to the blade, becomes submerged, only the latter part is developed, the intermediate tissue being arrested, as in the Water Crowfoot. This is the commonest result. On the other hand, a long, linear form is the commonest among monocotyledonous water-plants. This is rarer in Dicotyledons, but it is seen in the Mare's-tail (*Hippuris*), the Awl-wort (*Subularia*), Shore-weed (*Littorella*), and Water Lobelia (*Lobelia Dortmanna*). A similar form is found in the cryptogamous plant, the Quillwort (*Isoetes lacustris*).

This linear type of submerged leaf usually differs from a similar one so common in Monocotyledons in that, being a degraded form of a pinnately nerved blade, the lateral veins arise from the basal part of the midrib and then run more or less parallel to the other end, whereas in Monocotyledons with parallel venation they all commence parallel by having issued from the stem separately, and continue so to the apex. Moreover, in a dicotyledonous leaf the lateral veins are offshoots from the midrib, but in Monocotyledons they are isolated throughout, diverging right and left till one or a few only reach the absolute apex.

Occasionally the submerged leaf remains complete, but is very thin, as of the White Water-lily and the Great Spearwort (*Ranunculus Lingua*).

Comparing submerged leaves with those of the same plant in air, and seeing that the same dissected form is common to a very great number of leaves of Dicotyledons when submerged, we are quite justified in concluding that water is the cause of the arrest of the tissues in the latter; but it has been proved experimentally that it is so. MACCALLUM, in the United States, selected a plant called *Prosperpinaca palustris*, of the same family as our Mare's-tail. It has a lanceolate leaf with a pinnate venation. When growing in water with the upper

part of the stem in the air, the leaves *below* become dissected by the total arrest of the intermediate tissue, while those in air are completely formed. The suggestion was that the living protoplasm of the stem was injuriously saturated, so that it was too weak to make a perfect leaf. Acting on this "working hypothesis," he made the water denser by dissolving certain nutritive salts in it. This set up "osmosis," the result being that his assumption proved to be correct. Water was withdrawn from the stem, and the subsequent leaves were perfectly formed, though under water.*

Nature's experiments may frequently be seen. Thus if *Ranunculus trichophyllus*, which has no floating leaves, grows very thickly, several branches may be forced up into the air. When this is the case, the whole of the tissue changes and becomes adapted to air from the water-level upwards. If the pond dries up, the Crowfoot grows just as well when rooted in the mud.

If it be *R. heterophyllus*, then both the submerged and floating types of leaf are found in air. If the seeds be sown in a garden, they all come up retaining these two forms of leaf, acquired during many generations of an aquatic life.

The Sheathing Base of the Leaves of Aquatic Plants.—Another feature common to aquatic and semi-aquatic plants, which often grow tufted because the stem is arrested, is to have a broad base to the leaf-stalk, thus more or less sheathing the stem. This is due to the fact that while an ordinary leaf-stalk or petiole of a plant living in dry conditions usually receives one or three strands out of the woody cylinder of the stem, a good many more are supplied to the leaves of aquatic plants; because the bundles or "strands" have become more or less separated in the stem; so that the petiole, so to say, widens out to receive them. This occurs in many of the *Ranunculaceae* and *Umbelliferae*, a portion of which families are now of an aquatic habit, and probably several others were so formerly.

In some plants a rather different procedure takes place. There is a tendency to form a horizontal nodal plexus of interlacing fibro-vascular bundles connecting the vertical strands; from this several pass off into the leaf-stalk, which widens into a sheath. This may be seen in the Lesser Celandine (*Ranunculus Ficaria*) and Winter Aconite (*Eranthis hyemalis*), Marsh Marigold (*Caltha palustris*), Docks (*Rumex*), Fennel (*Poeniculum*), and other umbelliferous plants.

The Sequence of the Forms of Some Aquatic Leaves.—In the forms assumed by leaves of aquatic plants there is a kind of sequence in their development. Thus of the Water-lily family, in *Victoria regia*, being an annual, it is especially observable. Tracing the development from germination, the first leaves are greatly arrested, consisting of sheathing petioles only, comparable in form but not

* *Bot. Gaz.* vol. xxxiv. p. 93. This experiment agrees with the results of "Water Culture." Many plants are grown in water for experimental purposes, the water having been first supplied with nutritive substances. The tap-root is no longer arrested, but grows with secondary rootlets, &c.

identical with the flat, linear blades of some aquatic Dicotyledons, as *Littorella*, &c., already mentioned. In these it will be found that the veins running parallel to one another *branch at the base* of the blade from the central midrib, whereas in the linear leaves of Monocotyledons they all enter the sheath *separately*, and then run parallel from the base to the apex.

On approaching the surface of the water, the parallel veins widen out, and so an elliptical blade is formed. Again, by a lateral downward growth, the blade becomes spear-head shaped. This is followed by an arrow-head shaped blade. This may be the final stage, as in the Arrow-head (*Sagittaria*). The two basal points may, however, give way to a rounded form, the blade becoming cordate, as in the Water-lily. If the petiole grow up into the air, the lower parts of the blade may more or less grow together and become peltate, being sagittate as well in *Caladium*, but circular in *Nelumbium* and our moisture-loving *Hydrocotyle*.

These stages can be well seen and compared with one another in *Victoria* and *Sagittaria*.*

The Degeneracy of the Reproductive Organs.—The flowers of Water-lilies, Buck-bean, *Villarsia*, and Water-violet are conspicuous and attract insects, which visit them for honey. If, however, flowers are neglected by their insect friends they become inconspicuous by degeneration, and, especially if growing in water, they may become still more degraded in consequence. This may be seen in the Mare's-tail, Water-Milfoil, Water-Starwort, and the Sea Grasswrack. In such the calyx and corolla may vanish and the stamens and carpels be reduced to one each.

But further, in Dicotyledons the degeneracy may attack the minutest microscopical structures of the pollen formation as well as of the embryo sac and the embryo within it. This last may be arrested in growth at the pro-embryonic state, consisting of a minute globular mass of cells without any differentiation at all.

An ordinary terrestrial dicotyledonous embryo is seen in germinating mustard and cress. It has two primordially leaves or cotyledons, with or without a stem below called the hypocotyl. The terminal bud between the cotyledons is the plumule, and the stem is continuous with the root under the ground.

The first stage of the embryo is the same in all plants and consists of the globular mass of cells, without any sign of the above-mentioned parts. This is the condition at which water sometimes arrests it in the seed, as in *Ranunculus Ficaria*. Consequently such seeds take a long time to germinate.

In Water-lilies the formation of the two cotyledons has been observed. A crescent-shaped ridge is formed on the globular "pro-embryo." This ridge bears one of the cotyledons. The other cotyledon

* I have described them more fully, with figures, in my *Heredity of Acquired Characters in Plants* (Murray) and in *A Theoretical Origin of Endogens from Exogens through Self-Adaptation to an Aquatic Habit*. *Journ. Lin. Soc. Bot.* xxix. p. 485. See also *Annals of Botany* (1911).

has, as it were, insufficient space for a similar crescent-shape base to form a large sheathing base. This appears to be *the first indication of the suppression of one cotyledon, as takes place in the Lesser Celandine.**

The Return to Land.—Many land plants carry “aquatic characters” in their structure, such as air-chambers, the dislocation of the strands in the stems and petioles, &c. It is therefore presumable that they have had an aquatic ancestry. A familiar example is the Lesser Celandine (*Ranunculus Ficaria*). This is now a moisture-loving plant, and often grows to a great size in damp places, as in Malta, where it is called var. *calliæfolia*, as resembling the Marsh Marigold. It can easily be seen that the stem and petioles contain air-chambers; the leaves, too, are hairless and heart-shaped, not at all like those of buttercups, but resembling the floating leaves of the Water-lily, *Villarsia*, and Frog-bit; they also have stomata on the *upper* sides of the blades: all these are characters found in aquatic plants.

Now these and other characters, acquired when the Lesser Celandine was an aquatic plant, are now permanent and hereditary. But such are not always so. They may at first be transient only; or if the interchange of locality be frequent, as in amphibious plants, and such as grow half in and half out of the water, the aquatic characters may not be at all hereditary, but reappear only when the plant happens to grow in water. If, however, an aquatic plant has lived for many generations in water, then the acquired morphological characters become permanent, and appear whenever the plant grows on land. This we have seen to be the case with *Ranunculus heterophyllus* and *R. trichophyllus*. The anatomical characters are, however, always completely changed in adaptation to air.

Conclusion.—It will now be seen that the effect upon plants of water is to bring about *degeneracy* in every organ; but that, while doing so, this “response” to the “direct action” of water puts the plant in complete adaptation to it; so that the most casual observation shows how such plants can multiply to an enormous extent, so as to block up our rivers and canals, sometimes to such a degree as to impede navigation.

My object in the next lecture will be to show that *all* Monocotyledons, not only aquatic members of this class, but all terrestrial species as well, exhibit precisely the same characters, proving them to have descended from aquatic Dicotyledons; though in the case of all the terrestrial species of Monocotyledons now, these have reacquired the microscopical or anatomical structures necessary for an aerial existence.

* As the single cotyledon of this plant is often notched, it has been thought that this indicates a *fusion* of the two blades; but such a notch is by no means uncommon where the two cotyledons are present, as in mustard, *Convolvulus*, &c. There are certain other terrestrial Dicotyledons which have only one cotyledon, and as a coincidence they still have other features which seem to point to a long lost aquatic ancestry. The European Water Chestnut (*Trapa natans*), a thoroughly aquatic plant, has only one. It is allied to the Mare's-tail family.

PROPAGATION AND CULTIVATION OF FRUIT TREES IN JAPAN.

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PROPAGATION.

THE familiar methods of propagation of fruit trees by cuttings and grafting are well known in Japan, and are performed with the highest skill. Our forefathers practised grafting and propagation by cuttings and layers, and the like, as done in Europe and America, from quite early times. They were entirely ignorant, however, of budding, but with the introduction of Western civilization that operation, too, has been brought into use, and its practice has spread throughout the country, with successful results everywhere. Our fruit growers acknowledge its merit through experience, but being highly skilled in grafting they have not yet come to rely upon it, except in the case of peaches and nectarines. The propagation of these two fruit trees by our common method of grafting is quite unreliable, even in the most skilful hands, and budding has been adopted in recent years.

The popular methods widely used among our nurserymen and growers are methods of grafting, while stocks are raised from seeds and cuttings. The following methods of grafting are most in use:—

1. "Kiri-tsugi." Similar to the "crown grafting" of Americans.
2. In-arching or Grafting by approach. (Yobi-tsugi.)
3. Splice Grafting. (Sogi-tsugi.)
4. Side Grafting. (Hara-tsugi.)
5. Cleft Grafting. (Wari-tsugi.)
6. Cutting Grafting. (Sashi-tsugi.)
7. Root Grafting. (Ne-tsugi.)

Without going into details of each mode of grafting I propose to describe our methods of propagating each kind of fruit grown.

Crabs and apples are propagated by grafting. Many kinds of stocks are used, e.g., 'Rin-Ki' (*Pyrus Malus* var. *tomentosa*), 'Koringo' (*P. baccata* var. *mundshurica*), 'Kaido' (*P. spectabilis*), 'Inunashi' or 'Yamanashi' (*P. Calleryana*), 'Kozumi' (*P. Toringo*), Sand Pear seedlings, Quince (*Cydonia vulgaris*), 'Kwarin' (*C. sinensis*), 'Boke' (*C. japonica*). Of these, 'Rin-Ki,' 'Koringo,' 'Kaido,' 'Yamanashi,' and 'Kozumi' are commonly regarded as the best.

The season of grafting extends over a considerable time, from March to middle April being the best. The scions are usually cut in February, and lightly covered with soil in a shaded and sheltered place for at least a week before grafting. The time of storing scions may be prolonged at will. Stocks are grown from cuttings, root cuttings, division, layers, and seeds.

Sand pears and pears are commonly propagated by grafting, of which Kiritsugi, splice-grafting, and top-working are the commonest. Cuttings and layers are seldom used. Yamanashi, Quince, Koringo, and Kempo-nashi (*Hovenia dulcis*) are used as stocks. Japanese pears, with the exception of a few kinds, do not unite well on quinces. Results of double grafting of pears on quince lately attempted are being watched with interest. Grafting is done in spring, from March to early April. Beyond this period they can unite by regrafting, which is often done in May. Nurserymen cut the scions in February, but they may be cut and stored in the preceding month. Shrivelled scions unite rather better than newly cut ones. Stocks are grown from seeds, cuttings, and layers.

Quinces are propagated by layering, cuttings, and grafting. Yamanashi, Koringo, Pear seedlings, and quinces are used as stocks. Stocks are propagated by seeds, cuttings, layers, and division.

Pomegranates are grown from cuttings, layers; inarching, cutting-grafting, and root-grafting, and the same species is used as the stock. Stocks are propagated by seeds and other means.

Kaki or Date Plums are commonly propagated by grafting, layering, root-cutting, etc. 'Shibukaki,' an astringent variety, and 'Mamegaki' (*Diospyros Lotus*) are used as stocks, and seedlings of sweet varieties are also available. The season of grafting begins with the beginning of spring. Shoots cut for scions should be stored for some days in the same manner as with apple and pear scions, but the whole of the scion is never buried in the soil. Stocks are raised from seeds. They are slow in growth, and require at least three years from seed to reach a graftable size.

Loquats are propagated by grafting in which Kiritsugi, splice-grafting and cleft-grafting are commonly used. Cuttings and layers are also used. Loquat and Quince are used as stocks. The scions may be grafted on as soon as cut, and grafting begins on April 10.

Citrous fruits are commonly propagated by grafting. Amongst them, fingered citrons only propagate by cuttings in the open air. Trifoliate orange and 'Yuzu' (*Citrus Medica* var. *acida*) are used as stocks. The former has a dwarfing effect on the scion, while the latter has no such influence. They are grafted by late April, just before sprouting. It is necessary to graft on trifoliate oranges after they have begun to bleed, but with the other kind of stocks this rule does not apply.

Peaches and nectarines are commonly propagated by grafting. Lately, growers and nurserymen have adopted budding. Besides these methods, cuttings, layering, inarching are occasionally, but rarely, used. By grafting the results are very unsatisfactory, while by budding a high percentage of successes is achieved. Wild peaches, peach seedlings, dwarf peach ('Amento'), and Japanese plums are used as stocks. Amongst them the first two have been widely used. They are best grafted in March. Scions may be cut in January or in February, but late-cut scions do not strike well. Stocks are raised



FIG. 59.—PEACH TREES AFTER "BAGGING" (SHANGHAI HONEY).

Scene in a garden with 15-year-old trees, Kokugo-mura, between Tokio and Yokohama.

A tree carries some 500 fruits in bags.

exclusively from seeds. Japanese plums are propagated mainly by grafting, while cuttings, divisions, and suckers are often used. They take well on their seedlings, peaches, Ume and apricots, and are grafted at the same season as peaches. Scions may be cut before grafting as with peaches. The stocks are raised from cuttings or by seeds. Japanese apricots are propagated by grafting. Other means are seldom used. Seedling apricots and Japanese plums are the best stocks, though Umes are often used. Graft them in March and treat the scions as in peaches.

Ume trees are commonly grafted on a wild species called 'Yabai,' 'Bungo-ume,' and 'Naniwa,' and another wild variety. The first roots freely from cuttings. Besides grafting, cuttings and divisions are used. They are best grafted between the middle of March and the end of that month, the scions being used immediately on cutting.

Cherries are propagated by grafting, other means being rarely used. Wild cherry (*Prunus Pseudo-cerasus* var. *spontanea*), 'Yoshino' (*P. Pseudo-cerasus* var. *Sieboldii*), 'Higanzakura' (*P. Miqueliana*) and 'Fujizakura' (*P. incisa*) are the common stocks. Among them, the last has a markedly dwarfing effect upon cherries, as has the Mahaleb. Late February or early March are the best seasons to graft. The scions are treated as with peach. All varieties of cherries take easily, and stocks are readily grown by cuttings.

'Yusura' (*P. tomentosa*) is an ornamental shrub, and its fruit being palatable like cherries, it is much liked. It is easy to propagate by division, cuttings, and layers. Grafting is rarely used, but they unite well upon peaches. 'Niwa-ume' (*P. japonica*) has a similar habit and is similarly propagated.

Jujube is propagated by seeds, layers, division, and cuttings.

Myricas are grown from seeds, root-cuttings, layering, division, and grafting. The same species is used as stocks.

Chestnuts are propagated by seeds, inarching, side-grafting, cutting-grafting, and other means. Wild chestnuts and common seedlings are used as stocks. Grafting is done in March. Scions have to be cut and stored for about three to five weeks before grafting.

Japanese walnuts are propagated by seeds. In the case of grafting, walnuts are used as stocks.

Gingkos are propagated by seeds. Grafting is seldom used; but when it is done they are grafted on Gingko by Kiritsugi and splice-grafting.

Torreya is grafted by inarching on the wild species, but seedlings are often raised.

White Pines (*Pinus koraiensis*) are grafted by inarching or cleft grafting upon wild-grown black pine (*P. Thunbergii*).

Vines have long been propagated by layering in the growing centres of Kai. Cuttings, division, and grafting are also familiar methods. Propagation by means of "eyes" has lately been introduced from Europe. They are grafted on other grape cuttings or on the wild

grape (*Vitis Coignetiae*). Cuttings are best made from November to May, but late February to March is best to make them root. Grafting is best done in March.

Mulberries are grown by division, layering, cuttings, and grafting. They are very easy to strike. Divide in May, when shoots have grown one foot or more. Cuttings are made in February, and grafting is done at the same time.

Goumi are easy to divide, while cuttings easily strike. Work in spring before sprouting.

Japanese gooseberries are propagated by suckering, cuttings, layers, and divisions. The cuttings are inserted in beds in February, and earthed up in May around the shoots. When these have rooted they are divided.

Brambles are readily propagated by suckers and cuttings, the work being done before sprouting commences.

SOME ROUTINE OPERATIONS IN JAPANESE ORCHARDS.

Of the ordinary processes in Japanese orchards, irrigation and draining, "bagging," manuring, hoeing, and protecting against enemies are rather peculiar and noteworthy. Above all, the process of "bagging" has been extensively adopted by growers as a preventive measure against insects and fungi. By this method every fruit left after the final thinning is covered with a small paper-bag, made of old newspaper or of "mino-gami," a strong Japanese paper. The bags are provided with small holes in the corners to let out rain-water freely, and to prevent breaking.

Bags open at the bottom are preferred by some. In South Japan, where peaches, pears, and grapes are largely grown, bottomless bags made of newspaper are widely used. Near Tokio growers use another kind of bag, made with native paper treated with "Kaki-shibu," a juice expressed from unripe Kaki fruits. This juice makes the paper water-tight, and from its antiseptic quality is extensively used for many purposes, and the growing of date plums for the express purpose of obtaining the juice is extensively carried on in some parts of the country. When newspapers are used, new bags are annually supplied, while in other cases they are only partially renewed, the same bags being used for three years or more until they are worn out. An immense number of these bags is prepared, so that growers are always able to use them at the right time. The time of bagging varies for different fruits. Lately, bagging has been done very early, to minimise insect and fungoid injuries. For instance, the end of the stoning period is a good time to bag peaches, but we are accustomed to begin the work much earlier, just as they reach the size of ripe cherries. (Fig. 59.)

The primary aim of bagging is to protect the fruits from injury. It is recorded in our old writings that this method was used a long time ago by our forefathers, but it is now known that by the use of bags the growth of the fruits is favoured and their ripening is accelerated

by several days. Moreover, the skin remains very thin and delicate, and the fruits are larger in size, and above all they are more uniform, whether exposed or in shade, a point of high importance in the market.

Many kinds of enemies increase rapidly in our favourable climate, and have to be contended with to insure success. These operations become sometimes very troublesome, and take much time and labour, besides entailing additional expense. Moreover, they have to be done in addition to the primary occupation of our farmers and cultivators, which is rice cultivation. It is, therefore, too much to expect them to devote a large amount of labour to orchards or invest much capital in spraying and like operations. The widespread adoption of the process of bagging is to be attributed to these circumstances, as being the simplest, most economical, and most effective means for the protection of the fruits.

The paper bags are, of course, removed at the time of gathering. In the large centre of orchard-growing between Tokio and Yokohama the work is done several days before the harvest, in order to bring out the full colours of the fruits.

The work of bagging is done exclusively by women. A skilful hand can put on 1500 to 2000 bags a day, and even unskilled workers can bag 500 to 700 peaches or pears in a day. The mouth of the bag is closed so as to keep out enemies, and tied with twine, such as that of 'Riukiu' (*Scirpus triqueter*, L.) or young leaves of 'Shuro' (*Trachycarpus exaltata*, Wendl.), or with fine zinc or copper wire.

Bagging is mainly practised on peaches, pears, and apples, but early varieties, and those with hard flesh and less sugary contents, are always grown naked. Recently, the vine-growers of Kawachi and Kai have begun to adopt this method as a preventive against the mildew. In this case long bottomless bags covered inside with light sulphur paste are used. The results have been fairly good, but the superiority of spraying with Bordeaux mixture is admitted.

Trials made with Kaki fruits have proved conclusively that bagging is effective against premature dropping of the fruits due to insects and fungi. Moreover, as stated above, a thin skin, smoothness, large size, and uniformity of quality can be secured.

IRRIGATION AND DRAINAGE.

Our damp climate greatly reduces the necessity of irrigation in summer. Though abundant water is one of the essential conditions for rice plants in their growing stage, there is very little need of it for orchards. The extensive irrigation system of the orchards of such regions as California is a surprise to our home growers, and is beyond their imagination.

Only those pear orchards which are located on sandy soils near river-beds and seashores require irrigation in mid-summer. Even plantations on steep hillsides do not require much water in summer, whilst a light mulch, though seldom necessary, is often a great help to cultivation. A heavy mulch injures the plants, the exclusion of the heat and light

favouring the work of fungi and insects. Covering the surface of the ground to protect it from drying, as is done in America, is wholly unnecessary in our country. The great difficulty is to keep orchards clean in most seasons, except during some short periods of severe summer drought. We have to make use of the energy of the sun as much as possible, and to take advantage in every possible way of its benefits.

Aeration of soil should be encouraged by various means. Drainage is the first thing to be considered for the welfare of fruit trees. Our orchards generally have excellent open drainage. Gutters run regularly beneath the horizontal trellis of the pear orchards. On stiff, loamy soil good results are obtained by planting trees on mounds or on ridges, so as to secure good drainage and active aeration. Underground drainage also answers well in this case. All these processes are important in regions with heavy soils, as in the south, and particularly also in the cold regions of the north.

CULTIVATION AND HOEING.

These operations are done only by hand with small tools. Horse power and large implements, such as are seen in Europe and America, are never used in fruit plantations in this country.

The frequent rain and hot summer increase the trouble of weeding, and a large amount of labour is necessary to keep down the weeds in summer, especially in the rainy season. Farmers, therefore, strive to finish hoeing before the rainy season sets in. The cultivation of orchards is also carried on by hand, our object being to loosen the surface soil and assist in its aeration, rather than to lessen the evaporation and prevent drought, for our frequent rains are very apt to harden and bind together the surface soil, which is harmful to the well-being of fruit trees.

MANURING.

The application of manures to fruit trees has been long neglected, although manuring has been an important item in rice growing. Only recently, with the rapid progress of our fruit industry, experts have begun to pay attention to this subject, and are studying the effects of different manures on the quality and yield of fruit.

Chemical fertilizers have become familiar, and phosphates have proved effective on some kinds of fruits, while other kinds of fertilizers have not been much used.

Night soil, stable manure, litter and trimmings from the roadsides or meadows were almost exclusively used. Until recently there have been meadows reserved for the common use of each village. In some parts large quantities of weeds and undergrowth are spread thickly beneath the trees to serve as manure. The insufficiency of these manures has come to be acknowledged, and improvements are being introduced. Sea-weed is also often employed.

The application of potash, lime, and other mineral fertilizers is of great importance in this country, especially for fruit growing, but the majority of our growers and farmers still seem to be ignorant of it.

Besides the customary use of night soil and stable manures, wood and straw ashes, rape-seed cake, soy-bean cake, and fish-oil cake are used more or less. Fish manures can now be obtained at a cheap rate, and have also been imported from America in recent years. Bone manures are seldom used in our farms and orchards, since cattle rearing is hardly developed in this country.

Generally speaking, the majority of our farmers and growers are still ignorant of the use of manures for fruit raising, and no serious attention is paid to it, as is done in the case of rice cultivation.

Some experts have, however, made experiments on the relative value of different commercial fertilizers on orchard and other crops.

Particular kinds of manures, the nature of which is kept secret, are also used by some. For citrous fruits, for example, an expert grower in the Province of Kii is said to use common salt to enhance the keeping quality of oranges and mandarins. The first results were strikingly good, and since that time he has continued its use, and it is an established fact that the application of potash in reasonable quantities improves citrous fruits in many respects. Oranges and mandarins treated in this way improve in flavour, appearance and keeping quality. They also become much sweeter and more agreeable to the taste; the rind becomes of a deeper colour, thinner, smoother, and better attached to the pulp. The improved keeping quality is, however, the most important point. I have heard also from the communications in this JOURNAL that lemons improve in quality when soap-water is applied as manure. From these facts it probably follows that the application of alkali in reasonable quantities would markedly improve the quality of citrous fruits.

The above results have been verified in the Experiment Station at Okitsu, and similar results have also been arrived at by others. This fact is well known to our growers in citrous centres, who use ashes and other potash manures.

Besides, our farmers are accustomed to use salt to date plums as a remedy against the premature dropping of the fruit. They bury empty salt packages, made of straw, near the roots, or tie the packages on the stems. Saline water is said to be often poured around the trees.

Though accurate experiments have never been made to prove it, I am convinced that the dropping is caused by the rapid growth of the shoots and roots as well as by the want of some nutriment. According to Dr. YAMADA, chemist to the Fukui Experiment Station, Kaki trees in off years are markedly poor in phosphoric acid and magnesia, and also deficient in soluble carbohydrates, proteids, and amides. Particularly, the amides and magnesia show remarkably low percentages in off years.* From this fact the importance of magnesia salts for the bearing of date plums is clear. Thus, it is necessary to give such salts to exhausted trees in off years to improve the fruiting in the following year. Our custom of burying salt packages near the roots is justifiable from this point of view, because a mixture of sodium and magnesium

* Report of the Station No. 1, 1903.

salt is present in them. Furthermore, the dropping of the fruits occurs when the shoots have grown with rapidity. It always happens in the rainy season, from the middle of June to July, when the roots are in great activity. In this case an abundance of soluble salts in the soil would retard the absorption of water by the roots. "Mixture of salts impedes absorption more than pure salts, and certain kinds, sodium chloride, for example, act more energetically than others, for example, saltpetre," says Professor SCHIMPER.* "Sodium chloride acts on the vegetable organism in part physically, since, like other saline solutions, it impedes the osmotic absorption of water through the roots, and in part chemically, as after its entrance into the cells it affects metabolism. HANSTERN has made it probable that sodium chloride, as well as potassium chloride, stands in a certain relation to the manufacture of proteids from amides and carbohydrates."

From these results it appears highly probable that Kaki trees are much impeded in absorption by the application of salt to the roots, thereby causing physiological drought to the roots, even if the soil be saturated with water. The growth of the shoots is consequently retarded or inhibited, and the premature dropping of the fruits can be prevented. It may also be prevented by making oblique cuts in the stems to lessen the flow of sap to some extent.

* *Plant Geography upon a Physiological Basis*, Eng. Translation, 1903.

ON OLD-FASHIONED SCENTED PELARGONIUMS.

PART I.

By Miss M. C. TROYTE-BULLOCK, F.R.H.S.

EVERY gardener worthy of the name has at least one hobby, the joy of his heart, and a constant source of pleasure. I propose in this article to speak of one which delighted our great-grandmothers, but which for some reason I cannot account for went out of fashion, and is now only just beginning to creep into favour again, after long years of neglect. Scented Pelargoniums were in the late eighteenth and early nineteenth centuries favourite plants in the greenhouse (or glasshouse, as it was then called). I have before me as I write a list of 111 varieties from the garden catalogue of Melbury House, Dorset (the seat of Lord Ilchester), dated 1817. They seem to have been imported chiefly from Cape Colony, their native country, presumably, in the case of the earliest introduced varieties, by way of Holland, in or after 1795 probably by the English direct, our fleet having been sent out in that year to the Cape to support the Dutch supremacy there. Constant intercourse went on between the two countries until in 1815 the Cape was finally conceded to England.

I find these Pelargoniums form themselves into groups each headed by some old form, from which the later varieties may have had their origin—but this idea is very much open to correction. For instance, the earliest types known to me are *Pelargonium capitatum* and *P. cucullatum*, both introduced in 1690. With *P. capitatum* I group a long family of the sweetest and most popular varieties, such as *Radula major* (1774), *gravcolens* (1774), *variegatum* (1817), *roseum odorum* (1792), to name some of the oldest and best known, which have never lost their place in the affection of garden-lovers. This type is rivalled in popularity only by the *P. citriodorum* group, the oldest member of which is *grossularioides* (1731), a less well-known variety than the ever-popular and more delicious variety *crispum*—the lemon-scented—introduced in 1774. *Pumilum* and *grossularioides variegatum*, both of 1800, are seldom met with, and the same remark applies to *hirsutum* (1788), a charming variety also known as ‘Lady Mary.’ *Betulaefolium* (1759), with *punctatum* (1794), come next in seniority as a group, and with them I class *diadematum* and *Balbisianum*, though I suppose none of these are strictly scented Pelargoniums; still they are included as such in the Kew collection, and are quaint and interesting enough to keep their place in the collector’s affection.

Then come the maddening *Quercifoliums* and the equally irritating *Glutinosums*. Anyone who has tried, as I have, to grapple with the nomenclature of these two large and most puzzling classes will wish, as I do, that someone in authority would take them in hand and settle

firmly once and for all what they should be called. The oldest *P. quercifolium* that I can trace is *majus* (1774), then *denticulatum* (1789), *pencillatum* (1794), and *undulatum* (1795). Of the Glutinosums the oldest type, dating from 1777, *pencillatum*, also 1777, 'Lady Lumsden' (date unknown) and the really charming *flicifolium*, and *pinnatum* are the most interesting forms; the rest of both classes I pass over in silence! Their aliases are as many as those of the classic burglar. Next in antiquity comes a charming trio, *gratum* (1778) (the ever-popular Cinnamon-scented), *abrotanifolium* (1791), and *artemisoides* (1817). *P. tomentosum* (the Peppermint-scented) (1790) appears to stand alone; so do *P. echinatum album* ('Moulton Gem') (1789), and *echinatum rubrum* ('Ariel'). I have come across no other forms of these so far.

I have left the oldest introduction of all (with the exception of *capitatum* of the same date), viz., *P. cucullatum* (1690), to the last, as except for its double form it appears to have no near relations, though possibly *mollis*, *conspicuum* (1810), Rollisson's 'Unique,' and 'Mrs. Kingsbury' may claim kinship. *Andersonii*, known in 1817, 'Scarlet Unique,' 'Moore's Victory' ('Lady Mary Fox'), 'Lothario,' and 'Shrubland Pet,' form a brilliant and conspicuous group, though with the exception of the first-named I know nothing of their dates or history.

I have not included in the foregoing slight sketch any of the many varieties I have under non-botanical names, such as 'Fair Ellen' and 'Fair Rosamund,' 'Duchess of Devonshire,' 'Mrs. Douglas,' 'Mrs. Maitland,' etc., for every collector seems to have different names for them, and it is high time, now the attractions of the scented Pelargoniums are beginning to be appreciated, that some expert should settle the nomenclature once for all.

And now as to the matter of collecting specimens. Do let me point out that one of the chief charms of a collection such as mine is that money cannot buy most of the varieties; barely one dozen of my 100 varieties have come from nurserymen. They are the spoils of about ten years' careful—and, let me add, sometimes extremely exciting—search and exchange. What triumph of orchid hunter in Borneo can beat the thrill of joy with which from the depths of a dirty and disreputable cabaret in the heart of the Ardennes one emerges with a treasure in one's arms, fruit of a long and stormy bargaining with M. and Mme. les Propriétaires? As to exchange—words will not express my gratitude to the many kind and generous fellow-collectors to whom I am indebted. From the old village postman (whose gift of a sprig of *gratum* practically started my collection) to the courteous Curator of Kew Gardens, all have combined to overwhelm me with kindness. My *best* friend was the result of answering a chance advertisement in a garden paper! From that generous Irish lady, my collaborator in this article, whose collection puts mine to shame, nearly half my specimens have come. We have never met, and that is the case with many another "friend by post," but the kind letters I receive from my

unknown correspondents form not the least of the pleasures of my collection. S. Wales, the Scilly Isles, Sussex, Dorset, all have proved happy hunting grounds, while one of my best specimens came out of an almshouse in Wiltshire. I tell this tale to encourage all collectors, and to warn them that they must not expect to walk into the nearest nursery-garden and buy a ready-made collection, properly named. But if anyone gets half the amusement, interest, and friendship out of their collection that I do out of mine, they will never regret their ride on this particular hobby-horse.

PART II.

By Miss FRANCES E. A. V. BRENNAN.

No one seems, as yet, to have taken up the classing and nomenclature of the Scented-leaved Pelargoniums, and they are in a very hopeless muddle, so I have tried to do it, in a very rough and sketchy way, hoping that someone also interested in the subject may do it more perfectly and more scientifically.

It seems as if the Capitatum group should, by order of seniority, be classed first, as the original was first introduced into this country in 1690. Perhaps the following table, giving dates of introduction and synonyms, may be a help to collectors:—

GROUP I.

Pelargonium capitatum.—Old Rose-scented variety of gardens, 1690

„	„	Kew variety.	
„	„	<i>nigricans</i> , 1777.	
„	„	<i>minus</i> , 'Rudola.'	
„	„	<i>majus</i> , 'Raspberry Leaf,' 'Westonbirt,'	
		1817.	
'Altar of Rose.'			<i>roseum odorum</i> , 1792.
<i>Radula</i> , 1774.			'Beauty.'
'Chit Chat.'			<i>Blandfordianum</i> .
<i>graveolens</i> , 1774.			
„	<i>variegatum</i> ,	'Lady Plymouth,'	1817.
<i>rapaceum</i> ,	'Little Gem,'	'Spotted Gem,'	1788.
'Scarlet Pet,'	'Lothario' of	Miss White.	

GROUP II.

P. citriodorum grossularioides, 'Gooseberry,' 1731.

„	„	<i>variegatum</i> ,	1800.
„	<i>crispum</i> ,	'Lemon,'	1774.
„	<i>pumilum</i> ,	'Tiny,'	1800.
„	<i>majus</i> ,	'Bridal Ring.'	
„	<i>maximum</i> .		
„	<i>compactum</i> .		
„	<i>semitrilobum</i> ,		1800.

'Dale Park Beauty.'	'Princess of Orange,' 'Killarney.'
'Curly.'	'Duchess of Devonshire.'
'Lady Scarbrough.'	'Lady Mary,' <i>hirsutum</i> , 1788.
'Prince of Orange,' <i>P. citriodorum maximum</i> (Kew), <i>maculatum</i> .	
<i>P. citriodorum maximum variegatum</i> .	

GROUP III.

<i>P. quercifolium majus</i> , 1774.	<i>P. quercifolium</i> , 'Clyne Seedling.'
„ <i>minus</i> .	„ 'Fair Ellen.'
„ 'Mr. Meredith.'	„ 'Lady Lumsden.'
	„ 'Miss David-son's Seedling.'
„ <i>undulatum</i> , 'Shelton,' 'Fair Emily,' 'R. Dean,' 1795.	
„ <i>pencillatum</i> , <i>glutinosum</i> , 1794.	
„ 'Stag's Horn,' <i>denticulatum</i> , 1789.	
'Sandbach Beauty.'	<i>P. filicifolium</i> .
'Tripod.'	<i>P. pinnatum</i> .
<i>P. denticulatum</i> , 1777.	'Pheasant Foot,' <i>asperum</i> .
„ <i>majus</i> .	<i>P. viscosissimum</i> , 1820.

After these three leading groups, which include a large number of varieties, I would place the 'Unique' section, which includes those kinds having the largest and brightest coloured flowers.

'Unique.'	'Agnes,' 'Heythrop,' 'Mrs. Maitland' (Kew).
'Clorinda.'	'Chippenhams,' <i>molle</i> .
'Tresco Abbey.'	'Miss Dorrien-Smith.'
'Mrs. Douglas.'	'Shottisham Pet.'
'Mrs. Earle.'	<i>P. diadematum</i> .
'Lothario.'	'Claret Rock.'
'Silly Isles.'	<i>P. Bullisianum</i> .
'Monsieur Nonin.'	'Mrs. Kingsbury.'
'Purple Unique,' <i>conspicuum</i> , 1810.	<i>P. Andersonii</i> , 1817.
'White Unique.'	'Pretty Polly.'
'Scarlet Unique.'	'Shrubland Rose.'
'Rollisson's Unique.'	

Many of the above are apparently hybrids from the true 'Unique.' There are also a large number of varieties which must stand alone, being quite distinct in every respect, such as:—

<i>P. abrotanifolium</i> , 1791.	<i>P. betulaefolium</i> , 1759.
<i>P. artemisoides</i> , 1817.	<i>P. punctatum</i> , 1794.
<i>P. gratum</i> , 1778.	<i>P. Endlicherianum</i> , 1855.
<i>P. fragrans</i> .	
<i>P. tomentosum</i> , <i>lobatum</i> , 'Lady Seymour,' 'Peppermint,' 1710.	
<i>P. cucullatum</i> , 1690, also its double-flowered form.	
<i>P. echinatum album</i> , 'Moulton Gem,' 1789.	

<i>P. echinatum rubrum</i> , 'Ariel.'	<i>P. glaucum</i> , 1775.
<i>P. pulverulentum</i> , 1822.	<i>P. ternatum</i> .
<i>P. ardens</i> , 1807.	<i>P. alchemilloides</i> , 1693.
<i>P. ionidiflorum</i> , 1724.	<i>P. terebintaceum</i> .
<i>P. carnosum</i> , 1724.	'Fair Rosamond.'
'Godfrey's Bride.'	'Kimberley.'
'Mr. Meredith.'	<i>P. multibracteatum</i> .
<i>saxifragoides</i> , 1890.	'Togo.'
<i>tetragonum</i> , 1774.	
'Mrs. Moore,' 'Moore's Victory,' 'Lady Mary Fox,' <i>altum</i> (Kew), 1807.	

Two hundred varieties, if not more, of the Scented-leaved Pelargoniums were in cultivation at one time. Where are they now? I know about a hundred and twenty. Some of them are difficult to manage and increase, and rather special treatment is necessary, as they require almost complete rest at certain periods. A few of these are *P. abrotanifolium*, *artemisoides*, *echinatum*, *Endlicherianum*, *pulverulentum*, *ardens*, *ionidiflorum*, *carnosum*, *tetragonum*.

ORIGIN AND HISTORY OF OUR GARDEN VEGETABLES AND THEIR DIETETIC VALUES.*

BY REV. PROFESSOR G. HENSLOW, M.A., F.L.S., V.M.H.

IV. GREEN VEGETABLES (*cont.*).

ONIONS AND LEEK.

THE following species of *Allium*, L., are cultivated:—The common onion, *A. Cepa*, L.; a nearly allied species, *A. fistulosum*, L., the Welsh onion; *A. sativum*, L., the garlic, and a nearly allied form, the sand leek or wild Rocambole, *A. Scorodoprasum*, L.; the shallot, *A. Ascalonium*, L.; the chive, *A. Schoenoprasum*, L.; the leek, *A. Ampeloprasum*, L. var. *Porrum* (genus, L.).

The sand leek, the wild leek, and chive are natives of Great Britain, though the second appears to be naturalized on rocky banks (Hooker).

Allium Cepa, L., is said to grow wild in Baluchistan and neighbouring countries, according to botanists quoted by De Candolle†; but it has been cultivated from time immemorial and spread over so many countries that it may have been apparently wild elsewhere. It has been used as a spell in Chaldea, possibly 5000 B.C.† It was the *Kormuon* of Theophrastus and the *Caepa* of Pliny, who observes with regard to the onion in Egypt: "Garlic and onions are invoked by the Egyptians when taking an oath, in the number of their deities." Juvenal, a contemporary of Pliny, wrote in his satirical manner, "While towns worship the dog, but none Diana, to injure the leek and the onion is wicked, and to crush them with the teeth—O Holy race! whose gods are born in the kitchen garden!" Another writer observes, "Water is the natural deity of Egypt, but parochially it is the bull at Memphis and the onion at Pelusium. The Egyptians have dared to place the leek and the onion among the gods of the sky; while some worship the crocodile, the cat, the dog, wolf, and monkey, others, onions and garlic!" The prolific bulb-bearing "tree" onion was introduced from Canada in 1820. The green bulbs which replace the flowers are useful for pickling.

"The strong smell and taste of onions, as of the garlic and the leek, are due to a pungent volatile oil, rich in sulphur; but the quantity of this oil is very minute. . . . Onions have a feeding value superior to that of white turnips. Water amounts to 91 per cent., albuminoids, 1.5 per cent.; mucilage, sugar, etc., 4.8 per cent. The nutrient ratio is 1: 3.5, and the nutrient value lies between 6 and 7."

WELSH ONION (*Allium fistulosum*, L.). The name "Welsh" is probably a corruption of "Walische" and "Walche," meaning

* Previous articles in this series have appeared as follows:—Vol. xxxiv. pp. 15-23, and vol. xxxvi. pp. 115-126, 345-357, and 590-595.

† *Origin of Cultivated Plants*, p. 67.

‡ "The Story of the Nations," *Chaldea*.

"foreign," as the walnut was called *Walischenote* in the fourteenth century. This species differs from the common onion in having the dilated part of the flower-stem in the middle and not at the base; moreover the alternate stamens are "trifid." "Russian botanists have found this species wild in Siberia towards the Altaï Mountains, on the lake Baikal in the land of the Kirghis." * It is known as the Rock Onion or Stone Leek in Russia. It has been cultivated in Great Britain since 1629.† At the present day it appears to be only grown, as the young spring onions, for salads. De Candolle regards Dodoens' figure of *Cepa oblonga* as a "hardly recognisable" one of *A. fistulosum*. His figure in "*Historia Stirpium*" is named "*Cepa*" and evidently is only the common onion and not the Welsh onion. It is figured in *Curtis's Botanical Magazine*, No. 1230, 1809.

GARLIC (*Allium sativum*, L.) is of great antiquity as a cultivated plant, as indicated by the many names it possesses in different countries. Our word comes from the Welsh *garlleg*. De Candolle has traced it through many regions and gives the deserts of the Kirghis of Sungari, in the S.W. of Siberia, as the only country with any degree of certainty, as its origin.* Herodotus says that an inscription was on the great pyramid of Egypt in his day, stating that 1600 talents had been paid for onions, radishes and garlic for the workmen who built it—probably about 3300 B.C.

Garlic is mentioned in several vocabularies of plants, from the tenth to the fifteenth centuries, and described by the herbalists of the sixteenth, from 1548 (Turner) onwards. Two British plants are called "Garlic," the wild (*A. oleraceum*), and the Crow (*A. vineale*); both have been used either as pot-herbs or for flavouring. A third species, *A. ursinum*, called Ransoms, has been eaten in times of scarcity.

ROCAMBOLE (*Allium Scorodoprasum*, L.). This species most nearly resembles the garlic, according to some authors; others make it very distinct. It has been said to be "undoubtedly wild" in the Alpes-Maritimes. Another botanist, Ledebour, says it is very common in Russia from Finland to the Crimea. "The natural habitat," writes De Candolle, "borders, therefore, on that of *A. sativum*; or else an attentive study of all the forms will show that a single species, comprising several varieties, extends over a great part of Europe and the bordering countries of Asia." ‡

It was not known to the ancients and its names are chiefly distinctive in northern countries, as Denmark, Sweden, Germany, where it was called *Rockenbolle*, i.e. *Bolle*, onion, on rocks, *Rocken*. The Rocambole is a British plant and sometimes called the Sand Leek; it is found in Yorkshire and Lancashire to Fife and Perthshire, as well as in Ireland.

* Ledebour, *Flor. Russ.* iv. p. 169; referred to by A. de Candolle, *op. cit.* p. 68.

† *Treasury of Botany.*

‡ *Origin of Cultivated Plants*, p. 63 ff.

SHALLOT (*Allium Ascalonium*, L.). Pliny in remarking that the Greeks have many kinds of onions, mentions "the Ascalonean, so called from Ascalon, a city of Judæa." This name has been corrupted to *echalote* in French, *chalote* in Spanish, and changed to shallot in English. De Candolle from his historical investigations is not led to consider it as a species, especially as Theophrastus regarded it as a form of *A. Ceba*, and there is no proof of its being wild anywhere. Moreover, it commonly has no flowers, being called *Ceba sterilis* by Bauhin. This fact indicates a long cultivation by bulbs, as it produces many like the garlic. De Candolle thinks it is a form of *A. Ceba*, dating from about the beginning of the Christian era.

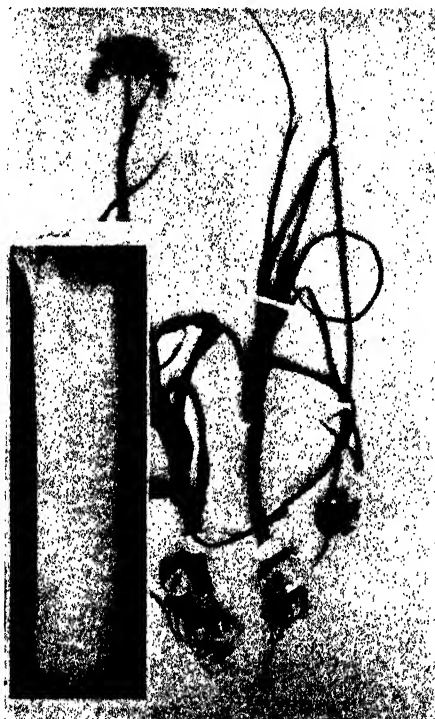


FIG. 60.—WILD AND BULBOUS LEEKS OF MALTA, WITH CULTIVATED FORM FOR COMPARISON.

CHIVE (*Allium Schoenoprasum*, L.). De Candolle observes, "This species occupies an extensive area in the northern hemisphere. It is found all over Europe from Corsica to Greece, to the south of Sweden, in Siberia, as far as Kamtschatka, and also in North America. The variety found in the Alps is the nearest to the cultivated form." It is also wild in the north and west counties of England and Wales. It was probably known to the ancients, as it is wild in Greece and Italy. It is figured by Dodoens, 1559, who gives the French name *Petit pourreau*, as the leaves somewhat resemble those of a rush. The specific name means "rush-leek."

The **LEEK** (*A. Ampeloprasum*, L. var. *Porrum*) is a cultivated

form of the Linnean species, common in the Mediterranean region (fig. 60) and Algeria. It was well known to the ancients. Pliny observes that the Emperor Nero used to eat leeks and oil to improve his voice, and that the best came from Egypt. It is mentioned in Numbers (xi. 5) under a word, *chatsir*, meaning "to be green," but as it stands in the text with onions and garlic the leek was probably meant, as with the others it was commonly grown in Egypt. With regard to the cultivation, Pliny tells us "the seed is sown thicker than otherwise. They are cut repeatedly till the bed is quite exhausted. If they are wanted to bulb before being cut, when they have grown to some size they are transplanted to another bed." The wild leek is bulbous, but under cultivation it produces no bulb; occasionally, however, it has one by "reversion," probably by growing in a too dry soil. Both Gerard (1597) and Parkinson (1640) figure it as bulbous. An Italian herbalist, C. Durante (1636), figures it with a straight, non-bulbous stem; so perhaps the modern form originated in South Europe. Linnaeus gives Holme Island in the Bristol Channel as a locality. This is where the scarlet paeony is also to be found, both being South European plants. It grows sparingly in the fields of Malta, whence those figured were taken. The cultivated bulbless leek is shown beside them for comparison with the original wild, bulbous plant.

PEA (*Pisum sativum*, L.).

The garden pea is not quite wild, though the field pea is a native of South Europe, from which it was possibly, if not probably, derived. Our earliest allusion to it is the discovery by Heer of peas in the lakewellings of the Age of Bronze in Switzerland and in Savoy; being recognized by the spherical form, like that of the wild field pea. De Candolle says there is no indication of the cultivation of the pea in ancient Egypt or India. He concludes as follows:—"The species seems to have existed in Western Asia before it was cultivated. The Aryans introduced it into Europe. It no longer exists in the wild state, and when it occurs half-wild, it is not said to have a modified form so as to approach some other species." The wild pea of South Europe and the cultivated in Egypt have rich crimson "wings," and the flowers are produced singly. The garden pea bears many on one main flower-stalk, perhaps the result of cultivation. The pea was well known to the ancient Greeks and Romans, Pliny remarking that it cannot stand cold, "Hence in Italy and the more rigorous climates it is sown in spring only." Pliny mentions a variety which appears to correspond with the modern, so-called Mummy pea, which has only a somewhat fasciated stem so that the peduncles are clustered together.* Gerard figures it under the name *Pisum umbellatum*, "the tufted or Scottish Pease." He says "they are like unto those of the fiede, or of the garden, in

* The story that they were derived from the tombs of Egypt is a fiction. No peas have ever been found in them; as Brugsch Pacha informed me himself in the Museum at Gezireh, Cairo.

each respect; the difference consisteth onely in that, this plant carieth his flowers in a round tuft or umble. . . . It is not very common." He figures four kinds. The first is the *P. maius*, Rowncivall Pease, "The flower of which is white and hath about the middle of it a purple spot." This appears to correspond with our field pea; but Gerard calls *P. minus* "garden and field pease," only adding, "The field pease is so very well knowne to all, that it were a needlesse labour to spende time about the description." Hence he means our garden pea. The third is the "tufted" and the fourth, *P. excorticatum*, "Pease without skins in the cods." He thus describes it:—"They differ not from the precedent, saving that the cods heereof want that tough skinny membrane in the same, which the hogs cannot eate by reason of the toughnesse; whereas the other may be eaten cods and all the rest, same as kidney beanes are, which being so dressed, are exceeding delicate meate." This variety is still in cultivation and known as the "sugar-pea." It is not known when the garden or the field pea was introduced into England, but Turner figures it (1564), and Gerard adds a figure of the now so-called "Mummy pea."

Mr. W. B. Booth says:—"In Queen Elizabeth's time (about 1570), we are told, they were occasionally brought from Holland and considered a 'dainty dish for ladies.' For many years their culture does not appear to have been much attended to, but after the restoration of Charles II., in 1660, the taste for green peas became fashionable."

Peas, like other leguminous plants, are highly nitrogenous. Prof. Church gives albuminoids 22.4 per cent., starch 51.3 per cent., and mineral matters 3 per cent. The nutrient ratio is 1: 2.5; the nutrient value, 79

RHUBARB.

The garden rhubarb is botanically *Rheum Rhaponticum*, L. It is stated that it grows in Thrace and Scythia; Mr. W. B. Booth (in the "Treasury of Botany") adds by the river Volga (the ancient name of which was *Rha*), and gives 1573 as the earliest date of its cultivation in this country; and that in Queen Elizabeth's time "the leaves were used as a pot-herb and considered superior to spinach or beet; but it was only at the beginning of the nineteenth century that the stalks were used for tarts," etc. Mr. A. Forsyth suggested the use of the unopened flowering bud or inflorescence, within its bracts to be cooked as the stalks are. They possess a milder flavour and form a delicate dish.* With regard to the edible leaf-stalks Professor Church observes, "The chief nutrient in rhubarb is the sugar (glucose), which amounts to 2 per cent. of the fresh stalks. Its sour taste is due to oxalic acid, or rather to the acid oxalate of potash; oxalate of lime is also present. The following are the principal features: Water 95.1 per cent., albuminoids 0.9 per cent., sugar 2.1 per cent., oxalic acid 0.3 per cent. He adds: "As 1 lb. of rhubarb contains less than 1 oz. of solid matter, of which $\frac{1}{4}$ only is nutritive, it is obvious that the food value is very small."

* *Gardeners' Chronicle*, 1846, p. 5.

SEA-KALE (*Crambe maritima*, L.).

This is not at all common, but occurs in the sandy shores of England and the continent. It was eaten by the ancients, for Pliny thus speaks of it. "There is a kind of cabbage known by the name *Halmyridia*, because growing only on the seashore. It will keep green and fresh during a long sea voyage, put into oil-vessels lately dried. Nitre preserves the greenness when cooked, a result which is equally ensured by the Apician mode of boiling, or in other words, by steeping the plants in oil and salt before they are cooked." This is somewhat suggestive of "sour-kROUT." The first herbalist of the 16th century to distinguish this plant and figure it was Lobel (1576), under the name *Brassica marina monosperma*; *Brassica* being the true cabbage with a long pod containing many seeds; whereas the sea-kale has only one. He says that Turner suggested the name; but no mention of it is in his "Names of Herbes" (1548) nor in his "Herbal" (1568) where *Brassica marina* (as in other herbals) means the *Convolvulus Soldanella*. Gerard (1597) describes it as *B. marina Anglica*, as if it were a native only of England, but Hooker states its continental distribution is—"Coasts from Finland to the Bay of Biscay and the Black Sea." Gerard does not describe any use for it. Parkinson is the first to illustrate the characteristic globular, one-seeded pods. Mr. W. B. Booth says:—"It appears to have been known to the Romans, who gathered it in the wild state and preserved it in barrels for use during long voyages. From a remote period it has been used in this country by residents near the sea. . . . It was sold in Chichester in 1753. It was not known about London until 1767, when Dr. Lettsom cultivated it at Camberwell and was the first to bring it into notice." *

Sea-kale contains upwards of 93 per cent. of water, 1.4 per cent. of albuminoids, 3.8 per cent. of mucilage and starch, &c., and 0.6 of mineral matter.

SPINACH (*Spinacia oleracea*, L.).

Spinach is first figured and described by Turner (1568). He writes:—"Spinage or Spinech is an herbe lately found and not long in use, but it is so wel known amongst al men in al countreas that it nedeth no description." He only alludes to its supposed medicinal virtues. It is said to be a native of West Asia. Gerard (1597) describes it as a medicinal "pot-herb"; but adds that "it is eaten boiled. . . and is used in sallades when it is young and tender." "Prickly" and "Round" spinach are two varieties of the above.

Spinach contains much nitre and is a wholesome vegetable. There is 90 per cent. of water, 1.2 of albuminoids, 4.0 of carbohydrates, 2.0 of mineral matter.

SPINACH, NEW ZEALAND (*Tetragonia expansa*).

Closely allied to *Mesembryanthemum*, the Ice-plant is a native of Tasmania, Australia, and of South America as well as New Zealand,

* *The Treasury of Botany*, s.v. *Crambe*.

implying a probable early connexion by means of an Antarctic continent; for the depth of the ocean decreases northwards in the direction of the southern extremities of existing land; several species of the genus being found at the Cape. It is said to have been introduced by Sir Jos. Banks in 1772. The leaves are thick and used as a substitute for spinach, but the mucilage in the leaves is somewhat objectionable.

VEGETABLE MARROW.

A. de Candolle considered that botanical indications were in favour of a Mexican or Texan origin. In Gerard's "Herbal" (1597) there is a figure (fig. 61) which he calls the Spanish cucumber; raised from seed, "not long since sent out from Spain." It grows, he adds, to a foot in length, is green below, but yellow in the sun, with spots and lines of divers colours, but it is represented smooth, and not rough like a



FIG. 61.—VEGETABLE MARROW FROM GERARD'S "HERBAL" (MISCALLED CUCUMBER).

cucumber. The Spaniards might well have received this from Mexico. The figure would answer very well for a vegetable marrow, now known as *Cucurbita ovifera*, L., and if A. de Candolle be correct, it may be an American variety of *Cucurbita Pepo*, the pumpkin; while the gourds of Europe are forms of *C. maxima*.

Many small forms of fruits are cultivated of various shapes, as the Turk's Cap, and being forms of the species *C. verrucosa*, some are warted; others are globular, pear or bottle-shaped, and of different colours—some of these were figured by Parkinson (1640). Professor Church says of the vegetable marrow that "although the fruit is very watery, yet it contains more nutritive matter than its close ally the cucumber. The percentages are as follows:—Water 94.8, albuminoids 0.6, sugar, starch, fat and cellulose, 4.1; mineral matter, 0.5. The nutrient ratio is 1:5, the nutrient value 3.5.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

X.—LEAF-SPOT OF CELERY.

By F. J. CHITTENDEN, F.L.S.

DURING the years 1909 and 1910, and especially in the latter year, celery was attacked to a remarkable extent in many parts of England by a destructive parasitic fungus. Large numbers of diseased plants with minutely black-spotted, dying foliage were sent to the Laboratory for examination, mostly too late for much to be done to save the crop, and in every case they were found to be attacked by the fungus *Septoria petroselinii* var. *apii* Briosi et Cavara.

Severity of the Attack.—Many of the letters received spoke of the severe nature of the attack. Thus, Mr. W. W. Richmond Powell, of Old Dover House, Canterbury, writing on September 30, says: "The disease was first noticed about three weeks ago, and has since spread in the rows with great rapidity. This disease, hitherto unknown to me, is this year very prevalent in this locality. Last year plants close by thrived luxuriantly and without a trace of disease. Now, once the leaves are attacked the plants begin to dwindle and some look like dying out." Again, Mr. Herbert A. Powell, of Piccard's Rough, Guildford, writes: "This is the second year that the disease has half-ruined the crop;" and Mr. J. Muddell, of Sedgwick Park Gardens, Horsham: "I have tried sulphur and fresh lime, but it does not seem to check the disease in the least. I have eight hundred planted out, and I am afraid I may lose the lot. It has attacked the late-planted plants within the last few days." These extracts from correspondence, which are but examples of many similar ones, will serve to emphasize the severity of the attack and the necessity for watchful care and prompt attention if the disease should appear this season.

Symptoms of the Disease.—Usually the earliest symptom of the attack is the appearance of small pale spots, light brown, or yellowish, upon the otherwise healthy-looking leaves; on these spots close examination reveals the presence of numerous somewhat sunken, small black dots, scarcely visible to the naked eye, but easily seen by the aid of a lens. The pale spots upon the foliage, which are totally unlike the burrows made by the celery-fly larva, render the presence of the disease quite evident, but when the attack is really severe these spots are practically absent, and the whole leaf becomes an almost olive green owing to the enormous number of black points scattered over its surface and visible on both sides of the leaf. This appearance is quickly followed by the wilting of the foliage and the decay of the leaf stalk, which often shows the little black points upon it as well. In America, where celery is frequently lifted in the autumn and stored in sheds, the disease

is said to spread rapidly in the store, causing the decay of the leaf stalks and rendering the crop useless.*

The symptoms which have been commonly associated with the disease in this country very closely resemble those noticed and described by Briosi and Cavara.†

"Le foglie del sedano vengono gravemente danneggiate da questo parassito. Vi si manifestano delle macchie irregolari, dapprima gialliccie poi grigie, spesso confluenti, sulle quali appajono in gran numero peritecti puntiformi, bruni. Tutta la foglia in seguito passa dal color verde al giallo, diventa flaccida e marcesce."

The little black dots are the fruits (pycnidia or perithecia) of the fungus, the mycelium of which invades the tissues and produces the disease. Where the mycelium penetrates the cells of the leaf are killed, and thus the fungus not only robs the plant of food but reduces the effective area of the foliage, and so, even when the attack is not sufficiently severe to cause decay, interferes with and reduces the amount of growth made.

The Fungus implicated.—The fungus causing the disease belongs to the genus *Septoria*, and appears to be morphologically indistinguishable from one which causes a similar disease on parsley.‡ We therefore prefer to call it *Septoria petroselini* var. *apii*, the name under which it was first described, instead of adopting the name *Septoria apii* Rostrop,§ as CHESTER,|| KLEBAHN,¶ and some other writers have done, mostly on the ground that a different host plant is involved. The fungus produces pale spots, which are frequently confluent, of roundish or irregular shape, on both surfaces of the leaf; in severe attacks the whole leaf becomes rapidly olive-green; the perithecia are numerous, sunken in the tissue of the pale spots or occurring over the whole leaf, leaf stalk, stem and fruits, minute, black or almost black, flattened-globose, about 180μ – 250μ diam., with a thin parenchymatous coat, bursting slightly through the epidermis and opening at maturity at the apex by a minute round pore, through which the spores are extruded in a long curving, somewhat sticky mass, looking much like a tendril. Spores very numerous, colourless, filiform, straight or slightly curved, guttulate and septate. The septa are often difficult to see and the spores have been described by some observers as without septa,** but proper illumination and careful focussing rarely fail to render them visible. They measure 38μ – $42\mu \times 1.5\mu$ – 2μ . (Fig. 62.)

* Duggar, B. M. "Two destructive Celery Blights." *U.S.A. Exp. Stn., Cornell, Bull.* 132, March 1897.

† Briosi and Cavara, *I Funghi parassiti delle Piante Coltivate od utili*, 1890.

‡ See e.g. Saccardo, *Sylloge* xiv. p. 972. "*S. Petroselini* var. *apii* . . . maculis latis albicantibus, areolas flavidas continentibus; peritheciis sporulisque ut in typo." Briosi and Cavara point out slight differences in size from the typical form, but the range of variation in that is very wide, and the differences pointed out do not appear to carry this beyond that range.

§ Rostrop, *Gardner's Tidende*, 1893, p. 180.

|| Chester, *Bull. Torr. Bot. Club*, 1891, p. 372.

¶ Klebahn, H., "Krankheiten des Selleries," *Zeits. für Pflanzenkr.* (1910), p. 4 et seq. and *Mittel. Deutsch. Landw. Gesell.*, pp. 63–67.

** E.g. Sorauer, "Die Fleckenkrankheit des Selleries," *Zeits. für Pflanzenkr.* vi. (1896) p. 191.

Distribution and Synonymy of the Fungus on Parsley.—The typical form of the fungus, *Septoria petroselini*, occurring on parsley has been known for a long time. It appears first to have been described by LIBERT* under the name *Ascochyta petroselini* Libert. In 1840 DESMAZIÈRES † described the same fungus under the name *Depazea petroselini* Desm., and later ‡ sent out specimens under the name *Septoria petroselini* Desm. This does not exhaust the synonyms, for in Klotzschii *Herbarium vivum Mycologicum*, Ed. II. Ser. I. (1855-58),

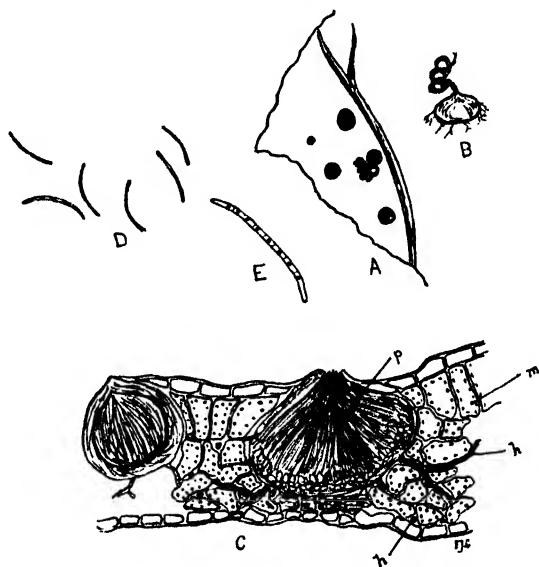


FIG. 62.—*SEPTORIA PETROSELINI* VAR. *APII* ON CELERY.

A, portion of leaf with fruit bodies of the fungus ($\times 10$); B, one of the fruit bodies isolated showing the spores issuing from the opening at the apex. C, vertical section of the leaf showing (p) one of the fruit bodies sunken in the mesophyll (m), and the hyphae (h) of the fungus running between the cells. D, spores; and E, a spore more highly magnified.

No. 560, Rabenhorst sent out the same fungus on parsley under the name *Spilosphaeria petroselini* Rabh. This typical form has been found attacking parsley in France, Belgium, Italy, Germany, Austria, North and (according to Saccardo§) South America.||

* Libert, *Exsic. Pl. Crypt. Ardi*, No. 252.

† Desmazières, *Ann. Sci. Nat. Bot.* (1840), p. 10.

‡ Desmazières, *Exsic. Plantae Cryptogames de France*, No. 674.

§ Saccardo, *Sylloge Rungorum*, iii. p. 530, No. 323.

|| I do not know upon what record the last-named country is given by Saccardo, but there are specimens in the British Museum Herbarium as follows from the other countries named: Exsiccata: Krieger, *Fungi Saxonici*, No. 1387; Desmazières, *Plantae Cryptogames de France*, Ed. I., Ser. I. (1825-51), No. 1174, and Ed. II. Ser. I. (1836-51), No. 674; Sydow, *Mycotheca germanica* (1903) No. 180; Briosi et Cavara, *I Funghi parassiti delle Pianta Coltivate od utili*, No. 143 (Pavia, Italy); D. Saccardo, *Mycotheca italica* (1902), No. 1137; Sydow, *Mycotheca marchia* (1880), No. 293, and (1887), No. 1752; de Thumen, *Mycotheca universalis* (1876), No. 1296 (Parma); Rabenhorst, *Klotzschii Herbarium vivum Mycologicum*, Ed. II., Ser. I. (1855-58), No. 560 (Doemitz); Libert, *Pl. Crypt. Ardi*, No. 252; L. Fuckel, *Fungi Rhenani*, No. 450; de Thumen, *Fungi Austriaci* (1873), No. 1196; Seymour and Earle (1892), No. 441 (New Brunswick, N.J.).

In my experience, parsley has not so far been very frequently or seriously attacked in this country. We have a single specimen collected in our own garden at Broomfield, Essex, in 1906, and there is one collected by Mr. D. A. Boyd "on fading leaves of *Petroselinum sativum*," at Seamill, Ayrshire, in June 1897, in the British Museum herbarium, and these are the only definite records of the disease in this country we have been able to discover.

Distribution of the Fungus on Celery.—It was not until 1890 that BRIOSI and CAVARA* drew attention to the disease on celery in the Orto di Pavia, and published specimens with a description and figure of the fungus. In 1891, HALSTEAD† mentions the occurrence of the disease in N. America, and F. D. CHESTER found it in the same year on the leaves of cultivated celery at Newark, Delaware.‡

Numerous references to the occurrence of the disease in various parts of Germany, where it seems first to have attracted attention in 1895, are quoted in Klebahn's very full paper,§ which shows the disease to be very widespread in that country; it does not appear to have assumed serious proportions in Germany prior to 1896, for FRANK,|| whose book on plant-diseases was published in that year, merely mentions the occurrence of *Septoria petroselini* on parsley; but SORAUER, who published a short note on the disease in 1896,¶ says in 1909; "Die Blätter der Petersilie werden von *Septoria Petroselini* Desm. heimgesucht. Schädlicher als der Typus wirkt eine Varietät *Apii* Br. et Cav. die nicht bloss in Europa, sondern auch in Nordamerika den Selleriekulturen erheblichen Schaden zufügt." It is evident therefore that the disease had in the few years after its introduction into Germany spread to a very serious extent, as, indeed, KLEBAHN indicates.** In N. America it is well-known and frequently extremely troublesome.†† It is also known in Italy,‡‡ Norway,§§ Belgium,||| Denmark, France.¶¶

* *l.c. ante*, No. 144.

† Halstead, *U.S.A. Exp. Stn., New Jersey, Report* 1891, p. 256.

‡ Chester, F. D., *l.c.*; Ellis and Everhart, *Exsicc. North American Fungi*, No. 2845.

§ Klebahn, H., *l.c.*, p. 1.

|| Frank, A. B., *Die Pilzparasitären Krankheiten der Pflanzen*, p. 429.

¶ Sorauer, P., *l.c.*

** Sorauer, P., *Handbuch der Pflanzenkrankheiten*, II. p. 410.

†† In addition to the specimen collected by Chester referred to above, there are others in the Natural History Museum herbarium from a hothouse in the Massachusetts Agr. College, Amherst, collected in November 1895, and from Greenville, New Jersey, September 1893 (Seymour and Earle, *Exsiccata* Nos. 474a, 474b). The disease is also referred to as very troublesome in several of the Experiment Station Bulletins, e.g. Humphrey, *U.S.A. Exp. Stn. Mass. Rept.* 1891, p. 231; Halstead, *l.c.*; Duggar, B. M., and Bailey, L. H., "Notes upon Celery," *U.S.A. Exp. Stn., Cornell, Bull.* 132 (1897), pp. 201-230; Sturgis, W. C., "On the prevention of leaf-blight and leaf-spot of Celery, *Cerospora Apii*, and *Septoria Petroselini* var. *Apii*," *U.S.A. Exp. Stn. Connecticut, 21st Ann. Rept.* (1898) pp. 167-71, etc.; see also Duggar, B. M.

‡‡ E.g. Briosi and Cavara, *l.c.* Saccardo, D., *Exsiccata Mycotheca italica* No. 167, from Vittorio (Treviso), Sept. 1897 (sub nom. *Septoria Petroselini*!).

§§ Schöyen, W. M., *Beretning om Skadeinsekter og Planter sygdomme*, 1899 and 1900.

||| Nypels, P., "Notes Pathologiques," *Bull. Soc. Roy. Bot., Belg.* xxxvi. (1898), pp. 183-275.

¶¶ E.g. Delacroix et Maublanc, *Maladies Parasitaires des Plantes Cultivées*.

Twenty years have thus elapsed since the first recognition of the disease, and during this time it has spread into many of the countries where celery is cultivated. Its occurrence and distribution in England are noted below.

A curious and possibly significant fact is that there are apparently no records whatever of the fungus attacking wild plants. The celery occurs wild in marshes over a large area in Europe, North Africa, W. Asia and N.W. India, but the disease seems to have been spread with cultivated celery and not from the wild plants to cultivated ones, as so many fungi have done.

Synonymy of the Fungus on Celery.—The synonymy of the variety has been fully dealt with by KLEBAHN,* and it will be sufficient to note the following:—

Septoria petroselinii var. *apii* Briosi et Cavara (1891).

Septoria Apii Rostrup.

Phlyctaena Magnusiana (All.) Bresadola, in Allescher et Schnabl, *Fungi bavarici*, No. 188 (1891).

Rhaldospora nebulosa.

Septoria apicola Spegazzini, *Fungi Fuegiana* (on *Apium australe*).

Occurrence of the disease in the British Isles.—The fungus is referred to in several books dealing with diseases of plants caused by fungi published in this country, e.g. MASSEE†: “*Septoria petroselinii*, Desm. var. *apii* B. & C., causes celery leaves to become brown and studded with small black dots over the entire surface”; and COOKE‡: “The leaves of the parsley and sometimes of the celery are liable to become spotted with this disease.”

Neither of these authors suggest that the disease is known in Britain up to the time of publication of their respective books, nor do TUBEUF and SMITH§ record it as British.

The first definite record of it in England appears to be in this JOURNAL.|| A plant of diseased celery was sent from Colyton, S. Devon, for the inspection of the Scientific Committee on Nov. 6, 1906, which on examination proved to be attacked by this fungus. A diseased plant had also been sent to the Committee in Sept. 1902 and reported upon by Dr. COOKE, but no locality was given. Since 1906 each year has brought specimens in increasing numbers, and now they have been received from each one of the southern and most of the eastern counties of England. The next definite mention is in the *Journal of the Board of Agriculture*, vol. xiv. p. 481, where specimens from Welwyn, Herts, are referred to; in the same *Journal*, vol. xv. p. 604,

“Cette espèce est fréquente sur les feuilles du Persil et du Céleri (var. *Apii* Br. et Cav.); ses dégâts sont analogues à ceux que produit le *Cercospora Apii*.”

* Klebahn, l.c. See also Sorauer, *Jahresbericht 1901 des Sorderausschusses für Pflanzenschutz*, 133.

† Massee, G., *Text-book of Plant Diseases*, Ed. I. (1899), p. 270.

‡ Cooke, M. C., “Pests of Garden Vegetables,” *Journal R.H.S.* xxvii. (1903), p. 811.

§ Tubeuf and Smith, *Diseases of Plants induced by Cryptogamic Parasites* (1897), p. 477.

|| Chittenden, F. J., *Journal R.H.S.* xxxii. (1907), p. xcii.

reference is made to celery at Wimborne, Dorset, "suffering from a bad attack of the fungus *Septoria petroselini* var. *apii* B. & C.,"* and in vol. xvi. p. 1010, the following occurs: "A celery-leaf disease caused by a parasitic fungus called *Septoria petroselini* Desm. has been long known in this country and on the Continent. In this instance the leaf becomes studded with numerous small, irregularly angular, brown spots, each bearing a few very minute black points or perithecia, containing myriads of very slender needle-shaped spores. As a rule, when the fungus attacks celery an epidemic results, due to the rapid production and dispersal of spores."

The available evidence scarcely seems to justify the statement in the foregoing quotation that this disease "has been long known in this country." It really appears to be of comparatively recent introduction, and to be spreading far and rapidly each year. Furthermore, it appears to be spreading on cultivated celery, and not by attacking wild celery, for, as already pointed out, there are no records of the occurrence of the fungus upon wild celery. It must, however, be confessed that our knowledge of the occurrence and distribution of these minute fungi upon wild plants is very incomplete. It would be a useful and interesting piece of work for anyone with the requisite technical knowledge and leisure to ascertain precisely to what extent the fungi which attack our cultivated plants will infect their wild allies, and *vice versa*. Microscopical examination alone is unfortunately not to be relied upon, and may actually be misleading, for we have to reckon with two very curious phenomena in the physiology of fungi—polymorphism, and the perhaps even more strange case where morphologically similar fungi are restricted in their range of infective capacity, and cannot indiscriminately attack any variety even of one species. Only carefully conducted and controlled cultural and infection experiments are likely to give reliable evidence.

In his latest book of plant diseases, MASSEE† devotes considerably more space to this disease than in the earlier publication (*l.c.*), which may perhaps be looked upon as an indication that his experience is similar to our own, that the disease is spreading rapidly. Dr. G. H. PETHYBRIDGE informs me that the disease has lately greatly increased in Ireland.

The manner in which plant diseases of this type spread from place to place, and from country to country, often though separated by wide seas, is a problem that frequently presents great difficulties in its solution, and this is no exception. Two or three possible ways of distribution from place to place suggest themselves, especially the throwing of diseased plants and leaves, perhaps brought from another place, on the rubbish heap, whence they reach the garden. Most mycologists are of opinion that the spores contained in these pieces of diseased foliage, &c., form the source of infection in the succeeding season, for when once the disease occurs in a garden, it

* There is a specimen from Wimborne in the Kew Herbarium.

† Massee, G., *Diseases of Cultivated Plants and Trees* (1910), p. 425.

usually recurs in the following year. There seems little doubt that the spores are able to outlive the winter, and it is therefore very desirable that all such diseased refuse should be burned and not thrown upon the rubbish heap.

It must not, however, be overlooked that when the plants are attacked the "seed" of the celery may be attacked too, just as in most cases where the "seed" is in reality a fruit or a part of a fruit. Figure 63 shows some "seeds" taken from a commercial seed sample this season, having the fungus fruits upon them. It seems to be comparatively unusual to find them actually upon the fruit itself, though this is not rare, but they are frequent upon the piece of stalk on which the fruit grew, and which may or may not be still attached to the fruit. Of thirty-three samples of celery seed examined in the Laboratory this spring fourteen showed the perithecia of the fungus upon the seeds or the pieces of stalk mixed with them, and microscopical examination showed these perithecia in the majority of cases to contain spores still.

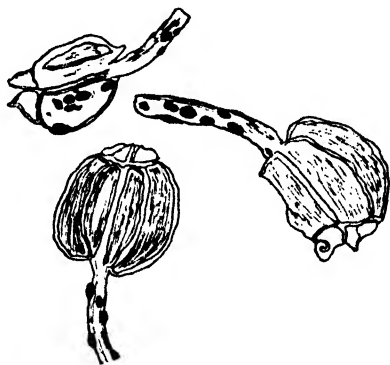


FIG. 63.—CELERY "SEED," WITH THE FRUIT BODIES OF THE FUNGUS *SEPTORIA PETROSELINI* VAR. *APII* SHOWING AS BLACK SPOTS UPON THEM. (MAG.)

Some of these diseased seeds had been grown in England, others on the Continent.

At my request Mr. D. FINLAYSON, F.L.S., the well-known seed expert of Wood Green, N., kindly washed several samples of commercial celery seed with distilled water, and microscopical examination of the washings showed the spores of the fungus in 50 per cent. of them.

KLEBAHN* has recently shown that washings from seeds saved from diseased plants contain spores of the fungus, and by spraying healthy plants with these washings he has infected them with the disease. Indeed he believes the sowing of seeds containing the spores of the fungus is the principal, if not the only, means of distributing the disease.

In view of the fact that many samples of seed carry the spores of the fungus, and that it has been shown that the spores obtained from the seeds are infective, it would be well for growers to keep a keen watch for the first sign of the disease in their plants, and to take prompt measures to check the spread of the trouble as soon as it appears.

* Klebahn, *l.c.*

The diseased plants or leaves should be removed and burned, and the remainder of the plants sprayed either with freshly-made Bordeaux mixture or with a solution of potassium sulphide (1 oz. to 3 gallons of water), repeating the spraying after an interval of about a fortnight or three weeks, and again if necessary. Where the disease has existed in a previous year it would be well to commence the spraying early in the season, whether the disease makes its appearance or not, as a safeguard.

The disease is usually noticed rather late in the season when it has attained proportions too great for any hope of checking it to be justified, but it seems as a rule to make its appearance somewhat late in the growth of the plants. We have, however, had specimens sent us as early as July.

XI.—A NOTE ON THE HABITS OF THE NARCISSUS FLY.

By F. J. CHITTENDEN, F.L.S.

IN this JOURNAL, vols. xxvi. (1901), p. 249 and xxvii. (1902), p. 181, the Rev. W. WILKS gave a summary of all that was known up to that time concerning the life-history and habits of the narcissus fly (*Merodon equestris* F.), together with a number of fresh observations. In 1910 this insect was scheduled by the Board of Agriculture under the powers conferred upon them by the Diseases and Pests Act (see JOURNAL R.H.S. xxxvi. p. 153), and those in whose garden it is found are bound, under a penalty, to report its occurrence to the Board, while certain countries have prohibited the importation of narcissus bulbs unless they are certified to be free from the narcissus fly or to have come from a garden where the fly is unknown.

Up to the time Mr. Wilks wrote the article referred to above, it was believed that the narcissus fly confined its attacks to bulbs of narcissus, and we have failed to find any reference to an attack upon any other plant. Facts have come to our notice, however, during the past winter, that are of some economic importance, for they show that the fly does not restrict its attacks to the narcissus.

In November 1910, a bulb of *Habranthus pratensis*, which had lain some time unplanted, was sent to us. The bulb had been imported from Holland. On examination it was found to be almost entirely eaten away inside, and had the usual tunnel opening below, while it contained a grub which we believed to be that of *Merodon equestris* almost full grown. The next post brought from another source a bulb of *Vallota purpurea* containing two precisely similar grubs. The latter was one of a number of *Vallota* and *Eucharis* bulbs which had been sent in May 1909 from Sierra Leone. Most of them when potted up grew well, but some failed to develop but weakly. Examination showed the presence of one or more grubs in each, and the characteristic hollowing out of the bulb by the grub.

The bulbs were potted up into separate pots, covered with muslin to

prevent the escape of the fly when it should hatch, and kept in a greenhouse during the winter.

The *Habranthus* bulb was completely destroyed by the grub which pupated in the soil. At the end of March the fly hatched out and examination showed it to be the narcissus fly, *Merodon equestris*, as had been suspected from an examination of the grub. The fly was sent to the British Museum (where it has been deposited), and Mr. E. E. AUSTEN, who kindly examined it, confirmed the identification.

The grubs which had attacked the *Vallota* became pupæ, but the flies did not properly develop. The pupæ cases were found in the soil and appeared to have had their contents destroyed, and as two centipedes were found in the pot it is possible that they had eaten them. There can be no doubt, however, that the insect in this case, too, was *Merodon equestris*. It does not seem necessary to suppose that the bulbs of *Vallota* were already infected when imported, for they were received in England and potted up at the time the fly would be on the wing in this country.

Mr. Wilks tells us that he has recently found grubs of this fly in the bulbs of lilies.

It is therefore certain that the narcissus fly will attack and destroy the bulbs of other plants besides the daffodil, and any effort designed for its extermination will have to take into consideration this possibility too.

[Since the above was in type Mr. F. C. ADAMS, of Fern Cottage, Lyndhurst, writing in the *Gardeners' Chronicle* of July 8, 1911, records the destruction last winter of four or five bulbs of *Hippeastrum* in his greenhouse by the larvæ of *Merodon*. In this case also he bred out the flies, which hatched during May and June.]

REPORT ON THE METEOROLOGICAL OBSERVATIONS MADE
AT THE SOCIETY'S GARDEN AT WISLEY IN 1910.

By R. H. CURTIS, F.R.Met.Soc.

IN beginning an account of the weather of 1910 and of the meteorological observations recorded at the Society's climatological station at Wisley, we cannot but refer with regret to the death of Mr. Thomas Frazer, who had been one of the observers at the Gardens since the establishment of the station in 1904, and had always taken great interest in its maintenance and efficiency.

From a meteorological point of view the year was one of considerable interest. The first half was mild, and the mean temperature was generally rather above the average, but this was due more to the absence of any very low minima than to the occurrence of high maxima, and the summer months were conspicuous by the absence of any really hot summer weather. The second half of the year was remarkable on account of the phenomenally low temperatures in July and November, and for the equally remarkable warmth of October and December. Much less than the average amount of snow fell during the year, but the year's rainfall, in most parts of the Kingdom, exceeded the average. There were no exceptionally severe gales, but thunderstorms were of somewhat frequent occurrence. Bright sunshine was deficient in most parts of the Kingdom, especially over the southern and midland counties of England; and fog was somewhat more than usually frequent, particularly near the coasts.

The observations for the months are as follows:—

January.—The weather during the opening month of the year was changeable. Throughout the first part it was generally warm for the season, with rather strong south-westerly to westerly winds, and with less than the usual amount of rain. Then a change in the type of weather took place, and wintry conditions became very general; in many parts of the Kingdom very low temperatures were recorded in the screen, and yet lower readings by the radiation thermometers exposed upon the grass. As examples, a screen reading of 10° was recorded in Berkshire, and 19° at Wisley; whilst in the northern half of Great Britain the thermometer fell still lower, and in a few localities got down to zero. Fah. in the screen, and to below zero upon the grass. There were also heavy falls of snow in many districts, some parts of Ireland coming in for a very large share; on the 26th it fell to the depth of 18 inches on the west coast of Scotland, and two days later to the depth of a foot in the West Riding of Yorkshire. The mean temperature in the south of England was, however, above the average for January, although it was considerably below in the north. Rainfall was nearly everywhere less than the average; and sunshine, notwith-

standing the generally unsettled character of the weather, was in excess of the average amount. Fogs were not so common as they frequently are in January, but thunderstorms occurred with unusual frequency for the middle of winter.

The results obtained from the observations taken at the Climatological Observatory in the Gardens at Wisley are as follows:—

Mean temperature of the air in shade	...	...	...	...	39°·8	
Highest	"	"	"	...	56°·9	on the 2nd
Lowest	"	"	"	...	19°·1	" 27th
Lowest	"	on the grass	...	...	14°·2	" 27th
Number of nights of ground frost	...	...	...	...	...	13
					At 1 ft. deep.	At 2 ft. deep.
Mean temperature of the soil at 9 A.M.	...	...	...	...	39°·6	41°·8
Highest	"	"	"	...	45°·0	44°·4
Lowest	"	"	"	...	34°·3	37°·5
Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100)	...	...	...	...	...	87 %
Rain fell on 17 days to the total depth of	...	...	...	...	...	1·80 in.
(Equivalent to about 8½ gallons of water to the square yard.)						
Heaviest fall on any day	...	...	...	...	0·67 in.	on the 27th
The prevailing winds were south-westerly.						
The average velocity of the wind was 8½ miles an hour.						
There were 77 hours of bright sunshine, equal to 30 per cent. of the greatest possible amount.						
There were 7 days on which no sunshine was recorded.						

February.—Throughout this month the winds were almost entirely from southerly and westerly quarters, and as a result the mean temperature was higher than the average, and unusually uniform all over the Kingdom. The latter part of the opening week, and the greater part of the third week, were the warmest periods; but at no time did the thermometer record any very high temperature; whilst, on the other hand, there were no severe frosts, such as frequently occur in February. At Wisley 54° was the highest temperature reached, but at a few places in the west it rose 4° or 5° higher. On two or three occasions, early in the month, 10° or 12° of frost occurred upon the grass at Wisley, but this was much exceeded in some parts of Central Scotland, and at Balmoral the low reading of 5° was registered by the thermometer upon the grass. The month was an unusually wet one, and although, as a rule, the daily falls of rain were not excessively large, yet a measurable quantity fell almost every day, and produced in most parts of the Kingdom a large total for the month. An exception in one direction to this state of things was afforded by the extreme north-east portion of Scotland, where the total fall did not amount to one inch; but, on the other hand, at some stations in the hilly districts of the west very large falls occurred over great tracts of country, and enormous totals were registered here and there; at one of these places—the Styne Pass—the fall for the month amounted to 45.10 inches! There were some severe gales in the course of the month, and strong winds were very frequent all through; but notwithstanding the disturbed and unsettled weather, there was more bright sunshine than usual, several places getting a

total considerably exceeding 100 hours, and even London recording 54 hours, which is 20 hours more than the usual amount for the month.

The results of the observations made at Wisley are as follow :—

Mean temperature of the air in shade	...	...	...	...	42°.2	
Highest	"	"	"	...	...	54°.0 on the 17th
Lowest	"	"	"	...	...	28°.0 " 9th
Lowest	"	on the grass	...	...	...	21°.0 " 9th

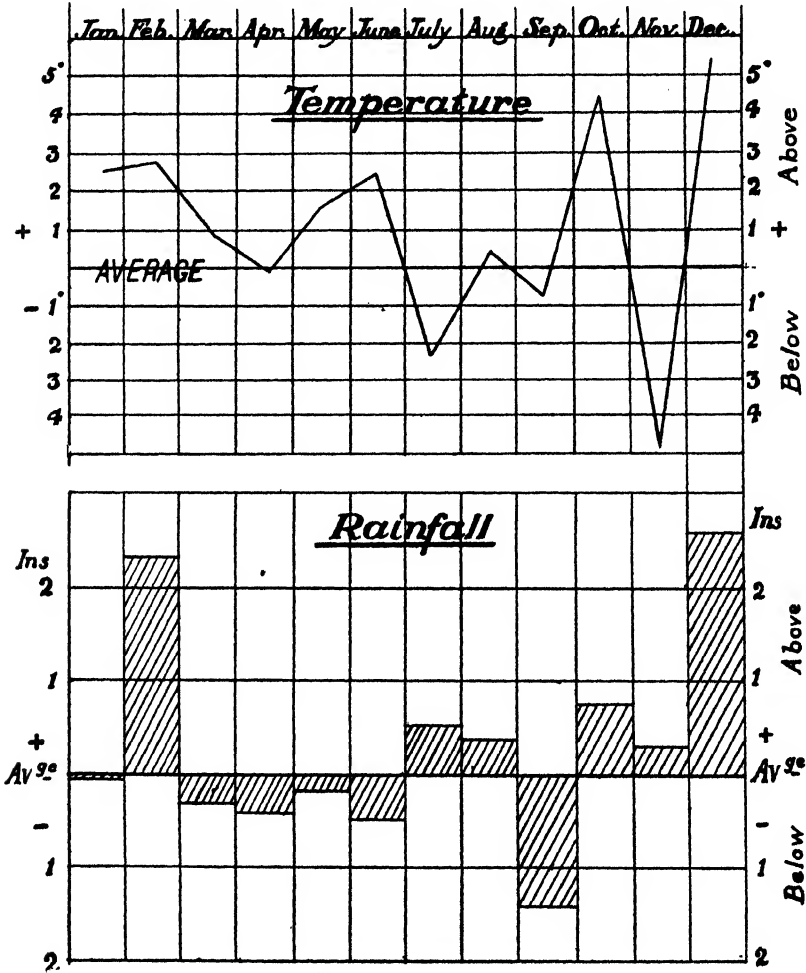


FIG. 64.—DIFFERENCES OF THE MONTHLY MEANS OF TEMPERATURE AND RAINFALL FROM THE AVERAGE.

						At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 A.M.	...	...	...	...	...	39°.8	41°.0	41°.9
Highest	"	"	"	...	...	48°.6	48°.2	48°.1
Lowest	"	"	"	...	...	35°.3	37°.5	40°.6
Number of nights of ground frost	...	...	...	...	...	...	...	10
Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100).	{	...	...	...	...	...	...	87 %

Rain fell on 23 days to the total depth of 3.23 in.
(Equivalent to about 15 gallons of water to the square yard.)

Heaviest fall on any day 0.60 in. on the 14th

The prevailing winds were southerly and south-westerly.

The average velocity of the wind was 9.8 miles an hour.

There were 77 hours of bright sunshine, equal to 28 per cent. of the greatest possible amount.

There were only 5 days on which no sunshine was recorded.

March.—With the advent of March the weather improved, and the boisterous, unsettled conditions of February gave place to a quiet and fairly fine period. There were, however, some rather sharp night frosts in some parts of the Kingdom, the thermometer in the screen falling several degrees below freezing, whilst on the grass readings below 20° were registered in a good many districts; at Wisley the lowest grass temperature was 20° , but the thermometer fell below freezing on twenty nights out of the thirty-one. The mean temperature of the month was, however, above the average all over the Kingdom, notwithstanding the fact that at no part of the month were very high readings registered. The month was also a very dry one, the rainfall over the greater part of England and the East of Scotland being under one inch, and over some considerable areas less than half an inch; whilst the number of days on which rain was measured was also small; at Wisley there were 9, but at some stations not very far removed they fell to 5 and 4. There was also a certain amount of fog, and at times it was dense; but except in some parts of Ireland there was more than the usual amount of bright sunshine; over the southern counties upwards of 50 per cent. of the possible amount was registered, and at Wisley there were only four days that were entirely sunless.

The results from Wisley are as follows:—

Mean temperature of the air in shade	...	...	...	...	46°.5		
Highest	"	"	"	...	63°.7	on the 21st	
Lowest	"	"	"	...	25°.1	"	3rd
Lowest	"	on the grass	...	...	18°.0	"	3rd
Number of nights of ground frost	...	...	...	...	...	...	11
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 A.M.	...	...	...	...	45°.8	46°.6	45°.7
Highest	"	"	"	...	51°.0	50°.0	47°.9
Lowest	"	"	"	...	39°.9	43°.2	44°.0
Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100)	...	...	...	...	...	...	77 %
Rain fell on 16 days to the total depth of	...	...	...	...	...	...	1.28 in.
(Equivalent to about 6 gallons of water to the square yard.)							

Heaviest fall on any day 0.18 in. on the 28th

The prevailing winds were from between south and north-west.

The average velocity of the wind was $5\frac{1}{2}$ miles an hour.

There were 127 hours of bright sunshine, equal to 31 per cent. of the greatest possible amount.

There were only 4 days on which no sunshine was recorded.

April.—The quiet settled weather of March came to an end with the close of that month, and was succeeded by a period of extremely unsettled weather, which affected the whole of the British Isles.

Cyclonic disturbances followed each other across the Kingdom with very little intermission, bringing heavy falls of rain to many parts, and especially to the northern and western districts, and as a result the rainfall exceeded the average everywhere, except over the southern and south-eastern parts of England. The month was also cold, and the conspicuous rise of temperature which one expects to meet with in April was looked for in vain. The highest readings were a little over 60° ,

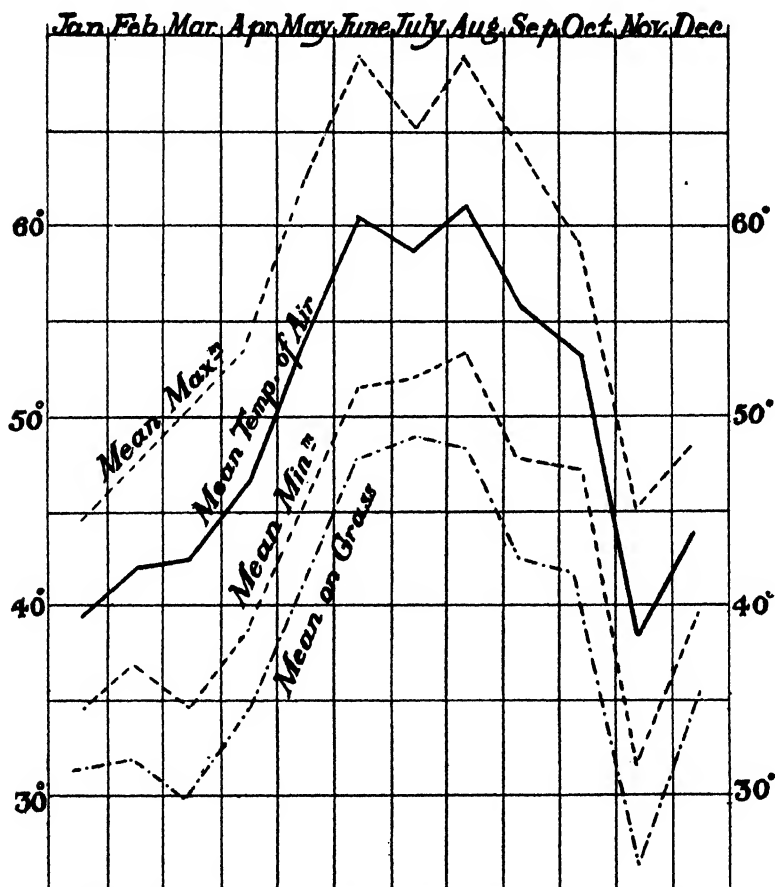


FIG. 65.—MEAN TEMPERATURE OF THE AIR; MEAN MAXIMUM AND MEAN MINIMUM TEMPERATURE OF THE AIR; AND THE MEAN TEMPERATURE ON THE GRASS FOR EACH MONTH.

and were recorded generally about the 20th; at Wisley the extreme was $63^{\circ}.7$ on the 21st, and only on one other day did the thermometer rise so high as 60° . There were several severe night frosts, the thermometer on the grass at Wisley falling to 18° on the 3rd, and to 25° on the 27th. Heavy hailstorms were very general on the 16th and 17th. The winds were somewhat variable in direction, but, as a rule, they blew from some westerly point, and occasionally they blew strongly. There was a general deficiency of bright sunshine, but the

shortage varied greatly in different districts; at Wisley the average amount recorded was about $4\frac{1}{2}$ hours per diem, which is about 30 per cent. of the possible amount in April, and only about 5 per cent. less than the amount generally registered.

The results from Wisley are as follows:—

Mean temperature of the air in shade	...	...	...	...	42°·7		
Highest	"	"	"	...	...	58°·0	on the 27th
Lowest	"	"	"	...	...	26°·0	" 30th
Lowest	"	on the grass	...	...	...	20°·6	" 23rd
Number of nights of ground frost	...	...	...	...	...	...	20
					At 1 ft. deep.	At 3 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 A.M.	...	...	...	...	42°·1	43°·6	43°·7
Highest	"	"	"	...	...	45°·3	45°·1
Lowest	"	"	"	...	...	38°·9	41°·6
Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100)	...	...	...	...	...	...	82 %
Rain fell on 9 days to the total depth of	...	...	...	...	...	...	1·18 in.
(Equivalent to about $5\frac{1}{2}$ gallons of water to the square yard.)							
Heaviest fall on any day	...	...	...	...	...	0·55 in.	on the 9th
The prevailing winds were from south-west, but there was a fair distribution all round the compass.							

The average velocity of the wind was $7\frac{1}{2}$ miles an hour.

There were 162 hours of bright sunshine, equal to 44 per cent. of the greatest possible amount.

There were only 4 days on which no sunshine was recorded.

May.—This was on the whole a quiet month, without very strong winds, a rainfall below the average, and a mean temperature rather above the average over the southern counties of England, but below it over the northern parts of the Kingdom. There were a few rather keen frosts early in the month, and on the ground the thermometer fell to twenty-four degrees at Wisley; but during the second half of the month there was a continuance of warm sunny weather, with maximum temperatures occasionally rising as high as 75°. Thunderstorms were not infrequent and occurred in most parts of the Kingdom, accompanied in many instances by hail, and occasionally by heavy falls of rain. The duration of bright sunshine did not differ greatly from the average; over the southern counties it was rather above it, and rather less than the average in the north and north-west. Winds were experienced from all points of the compass, but they blew chiefly from points in the west to north and north to east quadrants.

The results from Wisley are as follows:—

Mean temperature of the air in shade	...	...	...	...	53°·4		
Highest	"	"	"	...	...	75°·0	on the 22nd
Lowest	"	"	"	...	...	29°·3	" 10th
Lowest	"	on the grass	...	...	...	24°·4	" 9th
Number of nights of ground frost	...	...	...	...	...	...	6
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 A.M.	...	...	...	...	52°·8	52°·1	50°·3
Highest	"	"	"	...	...	59°·5	57°·7
Lowest	"	"	"	...	...	45°·3	48°·0
Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100)	...	...	...	...	...	...	78 %

Rain fell on 16 days to the total depth of 1.87 in.

(Equivalent to about $8\frac{1}{4}$ gallons of water to the square yard.)

Heaviest fall on any day 0.48 in. on the 18th

The prevailing winds were north-easterly, and through north round to west.

The average velocity of the wind was 5 miles an hour.

There were 212 hours of bright sunshine, equal to 44 per cent. of the greatest possible amount.

There was only 1 day on which no sunshine was recorded.

June.—The weather throughout this month was very broken and variable, being influenced by small, shallow disturbances which followed each other across the Kingdom in fairly quick succession. The mean temperature was about the average; in some parts maxima were registered exceeding 80° , but at Wisley the highest point reached was just below 80° , and on most days it failed to rise to 70° . There were thunderstorms in several districts from the 6th to the 8th, but the distribution of rainfall over the Kingdom was peculiar; in many parts of the northern half the total did not amount to an inch, whilst in the south-west of England and in many parts of Ireland there were totals as large as five inches; at Wisley it was less than an inch and a half. The largest totals of sunshine were experienced in the north; but as a rule it was less than the average in all districts, the smallest totals occurring in Ireland; London had 156 hours; Wisley, 175; and Yarmouth, 242 hours; whilst in Kings Co., Ireland, only 131 hours were recorded. There were no very strong winds during the whole month.

The results from Wisley are as follows:—

Mean temperature of the air in shade	...	...	...	...	$60^{\circ}.4$
Highest	"	"	"	...	$79^{\circ}.7$ on the 19th and 20th
Lowest	"	"	"	...	$42^{\circ}.2$ on the 15th
Lowest	"	on the grass	...	...	$37^{\circ}.1$ " 17th

				At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 A.M.	...	...	...	$60^{\circ}.7$	$60^{\circ}.0$	$56^{\circ}.4$
Highest	"	"	"	$65^{\circ}.5$	$63^{\circ}.3$	$58^{\circ}.8$
Lowest	"	"	"	$55^{\circ}.8$	$56^{\circ}.1$	$54^{\circ}.1$

Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100) 76 %

Rain fell on 13 days to the total depth of 1.84 in.

(Equivalent to about $6\frac{1}{4}$ gallons of water to the square yard.)

Heaviest fall on any day 0.41 in. on the 9th

The prevailing winds were south-west through west to north-east.

The average velocity of the wind was 4 miles an hour.

There were 175 hours of bright sunshine, equal to 36 per cent. of the greatest possible amount.

There were only 3 days on which no sunshine was recorded.

July.—The outstanding feature of this midsummer month was the striking absence of summer heat over those parts of the Kingdom which are usually the warmest at this season of the year, namely, the eastern and central districts. At Wisley the highest temperature recorded throughout the month was but 74° , and the thermometer touched 70° only on four days, and this was characteristic of the

whole of the central and eastern parts of England. Over the western and northern parts of the Kingdom there was also experienced an unusual amount of cool weather, but at times there were bursts of real summer heat, the thermometer rising to over 80° in Scotland and Wales. The mean temperature was, however, generally below the average, although owing to the cloudy skies, which not only intercepted the sun's heat by day but also checked radiation by night, the difference was less than might have been expected. At Wisley the temperature at night rarely fell below 50° in the screen, and never below 41° on the grass. Bright sunshine was, of course, very deficient, and at Wisley only a quarter of the possible amount was registered. London was still less favoured, having only 20 per cent. of its possible

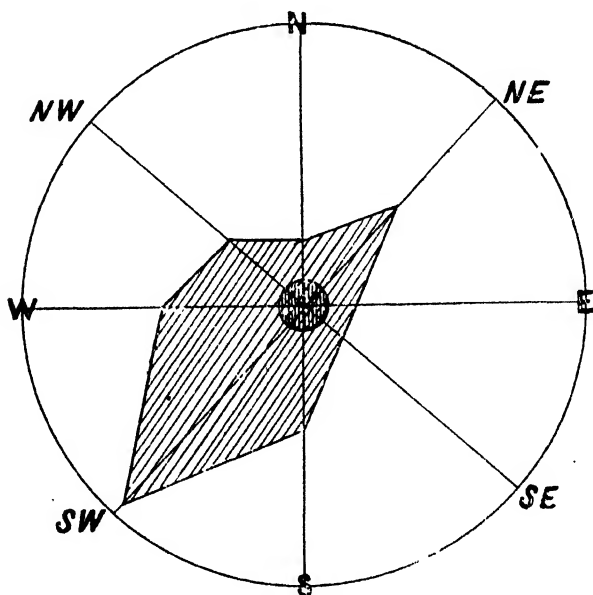


FIG. 66.—DISTRIBUTION OF WINDS DURING THE YEAR.

The relative frequency of calm is shown by the shaded circle in the centre.

amount, and some usually very sunny parts of the Norfolk and Suffolk coast received only 16 per cent. On the other hand at many places along the western coast of Britain and in Ireland considerably more than the average amount was recorded. Rainfall was not very different from the average; there was a deficiency in the extreme north, and also in the south of Ireland, but over a considerable part of the Kingdom the fall exceeded the average, although not to a very great degree. The prevailing winds were from between south-west and north-west.

The results from Wisley are as follows :—

Mean temperature of the air in shade	...	...	...	...	58°·7
Highest	"	"	"	...	74°·4 on the 28th
Lowest	"	"	"	...	45°·3 " 4th
Lowest	"	on the grass	...	...	40°·8 " 19th
There were no ground frosts.					

	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 A.M.	59°·9	60°·3	57°·8
Highest " " "	62°·1	61°·8	58°·2
Lowest " " "	57°·8	59°·6	57°·2
Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100) ... ..	...	...	78 %
Rain fell on 13 days to the total depth of ... ..	...	...	2·98 in.
(Equivalent to about 13½ gallons of water to the square yard.)			
Heaviest fall on any day ... ..	...	...	0·74 in. on the 3rd
The prevailing winds were from between south-west and north-west.			
The average velocity of the wind was 6 miles an hour.			
There were 121 hours of bright sunshine, equal to 25 per cent. of the greatest possible amount.			
There were 6 days on which no sunshine was recorded.			

August.—This was another very cool and unsummerlike month, the thermometer, as in July, only occasionally exceeding 70°. But whilst the maxima were low the night minima were unusually high, with the result that the mean for the month was nowhere greatly below the average, and in some districts it slightly exceeded it. Bright sunshine was very deficient, especially over those parts of the Kingdom where at this season it is generally most abundant; in the Channel Islands there was a loss of 10 per cent., and in some parts of southern England as much as 16 per cent. A measurable amount of rain fell at Wisley on fifteen days, and less than an hundredth of an inch was found in the gauge on six other days. The total fall was above the average in nearly all parts of the Kingdom. The month was rather more windy than is usual in August, the direction of the wind being very persistently south-westerly. As illustrating the abnormal character of the weather it may be mentioned that the only part of the Kingdom in which a temperature of 80° was registered was the Shetland Isles!

The results from Wisley are as follows:—

Mean temperature of the air in shade	...	...	...	...	61°·3					
Highest	"	"	"	...	76°·2 on the 12th					
Lowest	"	"	"	...	47°·3 " 23rd					
Lowest	"	on the grass	...	...	40°·0 " 23rd					
There were no ground frosts.										
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft deep.			
Mean temperature of the soil at 9 A.M.	...	...	...	...	61°·5	60°·9	59°·5			
Highest	"	"	"	...	63°·8	62°·2	60°·1			
Lowest	"	"	"	...	58°·2	58°·9	58°·2			
Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100)								...	...	79 %
Rain fell on 15 days to the total depth of								...	...	2·16 in.
(Equivalent to about 10 gallons of water to the square yard.)										
Heaviest fall on any day								...	...	0·40 in. on the 26th
The prevailing winds were from south-west.										
The average velocity of the wind was 5 miles an hour.										
There were 168 hours of bright sunshine, equal to 38 per cent. of the greatest possible amount.										
There were no days on which sunshine was not recorded.										

September.—The weather of this month showed a considerable improvement over that of the preceding summer and was dry and generally fair, with an average amount of sunshine over the southern half of the Kingdom, but somewhat less than the average amount over the northern portion. The mean temperature was nowhere much above the average, and in most districts was somewhat below it, the warmest days being those with which the month closed. A night frost which occurred on the 21st was very destructive to dahlias. The rainfall was exceptionally small for September, the month being one of the driest Septembers on record. At Wisley a measurable amount of rain fell only on four days; and the total fall only amounted to 0·6 inch, nearly the whole of which fell on the 13th-14th. The general rainfall over England and Wales was one-quarter of the average, and it was very little more than that for the whole of the British Isles. The prevailing winds were from north and north-east, but there were no strong winds throughout the month.

The results from Wisley are as follows:—

Mean temperature of the air in shade	...	...	...	...	55°·7		
Highest	"	"	"	...	74°·4	on the 28th	
Lowest	"	"	"	...	54°·1	"	1st
Lowest	"	on the grass	...	...	28°·2	"	21st
Number of nights of ground frost	...	...	...	...	...	...	2
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 A.M.	...	...	...	...	57°·1	57°·3	57°·7
Highest	"	"	"	...	60°·9	60°·0	59°·1
Lowest	"	"	"	...	53°·0	55°·3	56°·4
Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100)	...	...	...	...	...	...	82 %
Rain fell on 4 days, to the total depth of	...	...	...	...	...	...	0·60 in.
(Equivalent to about 2½ gallons of water to the square yard.)							
Heaviest fall on any day	...	...	...	...	...	0·42 in.	on the 13th
The prevailing winds were from north-east and north.							
The average velocity of the wind was 3½ miles an hour.							
There were 135 hours of bright sunshine, equal to 36 per cent. of the greatest possible amount.							
There were 5 days on which no sunshine was recorded.							

October.—The outstanding feature of the weather of this month was the remarkably high mean temperature, and in most districts the entire absence of frosts even on the surface of the ground. At Wisley the screened thermometer did not fall below 37°, and on the grass it only once fell as low as the freezing point. So far as vegetation was concerned the nights were never cold enough to materially affect it. Sunshine was, however, generally deficient, and at Wisley only sixty-seven hours were registered, or but one-fifth of the possible amount. The wind at Wisley was mainly from north-east, and occasionally it blew rather strongly. Rainfall was in excess of the average over the southern counties, but was somewhat below it over the northern parts of the Kingdom; during the opening days of the month, however, there was a continuance of the dry weather which had been so noticeable a feature of the preceding month.

The results from Wisley are as follows :—

Mean temperature of the air in shade	...	...	...	...	53°.3		
Highest	"	"	"	...	70°.7	on the 2nd	
Lowest	"	"	"	...	36°.7	"	21st
Lowest	"	on the grass	...	...	30°.0	"	21st
Number of nights of ground frost	...	...	...	...	...	...	1
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 A.M.	...	...	...	...	53°.5	53°.9	55°.5
Highest	"	"	"	...	58°.1	57°.1	57°.0
Lowest	"	"	"	...	49°.8	51°.1	53°.5
Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100)	...	...	...	...	...	...	91 %
Rain fell on 14 days to the total depth of...	...	...	...	...	...	...	3.04 in.
(Equivalent to about 14 gallons of water to the square yard.)							
Heaviest fall on any day	...	...	...	...	...	0.61 in. on the 12th	
The prevailing winds were north-easterly.							
The average velocity of the wind was 4 miles an hour.							
There were 67 hours of bright sunshine, equal to 21 per cent. of the greatest possible amount.							
There were 10 days on which no sunshine was recorded.							

November.—The weather of November was in marked contrast to that of the preceding month, for whilst October had been unusually warm, November was one of the coldest, and at the same time one of the wettest, on record. This was chiefly due to the constant succession of atmospheric depressions which traversed the country, bringing in their rear in each case a stream of cold northerly winds from Arctic latitudes. The result was that the mean temperature of November at Wisley was 15° lower than that of October, the normal difference being only 5½°. Frosts were registered by the screened thermometer on nineteen days, and on the grass on twenty-three occasions; the lowest screen reading being 20°, and the lowest on the grass 16°. The rainfall at Wisley did not greatly exceed the average, but a measurable amount fell on fifteen days and a trace on five other days; in other parts of England, however, the excess of rain was greater. Notwithstanding the disturbed weather a fair amount of sunshine was registered, and in most districts the percentage of the "greatest possible" amount was above the average; at Wisley it was 30 per cent. of the possible amount, but many southern and western districts considerably exceeded this figure.

The results from Wisley are as follows :—

Mean temperature of the air in shade	...	...	...	...	38°.6		
Highest	"	"	"	...	52°.7	on the 27th	
Lowest	"	"	"	...	19°.8	"	23rd
Lowest	"	on the grass	...	...	15°.8	"	22nd
Number of nights of ground frost	...	...	...	...	...	...	21
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 A.M.	...	...	...	...	40°.6	43°.2	48°.8
Highest	"	"	"	...	50°.4	51°.0	53°.3
Lowest	"	"	"	...	35°.6	38°.7	44°.3
Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100)	...	...	...	...	...	...	86 %

Rain fell on 15 days to the total depth of... .. 2.67 in.

(Equivalent to about 12½ gallons of water to the square yard.)

[illegible]

The prevailing winds were westerly and south-westerly.

The average velocity of the wind was 6 miles an hour.

There were 77 hours of bright sunshine, equal to 30 per cent. of the greatest possible amount.

There were 7 days on which no sunshine was recorded.

December.—The very remarkable difference between the mean temperature of October and that of November was followed by another unusual change, inasmuch as December proved to be one of the warmest Decembers experienced during the last forty years, and its mean temperature was higher than the normal by 50°. The maximum at Wisley was only once below 40°; and the minimum in the screen fell to freezing point on only four occasions, so that not only were the days warm but the nights were relatively even warmer; on the grass there was frost on nine occasions. The first half of the month was continuously wet, rain falling every day, and during this period nearly the whole of the rainfall of the month occurred; there were nineteen days on which a measurable amount of rain fell, and four on which an amount too small to measure was found in the gauge. The amount of bright sunshine was decidedly below the average. About the second week of the month there was some stormy weather, the wind in some districts blowing very strongly.

The results from Wisley are as follows:—

Mean temperature of the air in shade	...	...	...	...	44°·3	
Highest	"	"	"	...	55°·3	on the 24th
Lowest	"	"	"	...	25°·9	" 28th
Lowest	"	on the grass	...	...	18°·5	" 28th
Number of nights of ground frost	...	...	...	...	...	9

					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 A.M.	...	...	...		42°·1	42°·9	45°·5
Highest	"	"	"	...	46°·4	45°·1	46°·9
Lowest	"	"	"	...	37°·1	39°·5	43°·2

Mean relative humidity of the air at 9 A.M. (complete saturation being represented by 100) 90 %

Rain fell on 19 days to the total depth of	4.31 in.
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(Equivalent to about 20 gallons of water to the square yard.)

[illegible]

The prevailing winds were from between south-west and south-east.

The average velocity of the wind was 10 miles an hour.

There were 32 hours of bright sunshine, equal to 13 per cent. of the greatest possible amount.

There were 12 days on which no sunshine was recorded.

SWEET PEA 'AUDREY CRIER.'

AN EXPLANATION OF ITS VARIABILITY.

BY T. H. DIPNALL, F.R.H.S.

SEVERAL of the most beautiful Sweet Peas seem to be quite unfixable, notably Audrey Crier, Miriam Beaver, Olive Ruffell, and Syeira Lee, which is almost, if not quite, identical with Miriam Beaver.

I have long been interested in this peculiarity, but it was not until last summer that it occurred to me that a satisfactory explanation might be found on Mendelian lines. In a short trial row of Miriam Beaver I had forty-one plants of Miriam Beaver true, twenty of Helen Grosvenor, and eighteen of Romani Rauni, numbers having a ratio so near the 1 : 2 : 1 that we should expect if Miriam Beaver were a heterozygote, and the other two the dominant and recessive, that any other conclusion seemed impossible. The number of plants grown, however, was too small to admit of certainty, but it looks as if Miriam Beaver were an intermediate form between Helen Grosvenor and Romani Rauni, and consequently an instance of imperfect dominance. In this case, moreover, I had no means of learning the parentage of Miriam Beaver, and consequently cannot arrive at the truth with certainty. But with Audrey Crier I am fortunately in a better position. This lovely pea seems to be quite unfixable, and always throws the same rogues. There are four varieties which constantly appear : first, Audrey Crier proper, a beautiful salmon-tinted pink ; secondly, a pure white, Etta Dyke ; thirdly, a pale pink on a white ground, Countess of Northbrook ; and fourthly, an orange pink, Helen Lewis.

Thanks to the courtesy of the raiser, Mr. C.W. BREADMORE, to whom I wrote at a very busy time, and who replied almost immediately, evidently knowing that *bis dat qui cito dat*, I have been able to work out what I think is a satisfactory explanation of the vagaries of this pea. I started on wrong lines, but in the course of a correspondence with the Editor, he kindly sent me a copy of the proceedings of the Cambridge Philosophical Society containing an account of valuable work done by Mr. and Mrs. THODAY on "The Yellow Tinge in Sweet Peas" (Vol. XVI, Part I. p. 71 *sq.*), from which I have derived very great assistance.

Mr. BREADMORE tells me that Audrey Crier was raised by crossing Countess Spencer with Dorothy Eckford, and that the F₁ generation gave a pea of the grandiflora type, having the colour of Audrey Crier. This colour is important, as we shall see later on.

Mr. and Mrs. THODAY in the course of their experiments with Dorothy Eckford and Queen Alexandra came to the conclusion that, in addition to the two factors C and R to whose combined presence colour is due, there were three other factors involved in the production of a yellow tint. Two of these are recessive, and one dominant. The dominant factor D gives a magenta tint to the colour introduced by R.

The second factor y gives a yellowish flush to the sap, which is suppressed when the factor (Y) is present. The third factor, called X by

them, affects the yellow chromoplasts; when it is dominant (X) these are absent, when recessive (x) they are present and give a yellow tinge to the flower.

Audrey Crier is the result, as we have seen, of crossing a pure white, Dorothy Eckford, with a blue-pink on a white ground, Countess Spencer, and its colour is a pink flushed with yellow, making it a salmon-pink. This yellow tinge is evidently not present in Countess Spencer, so it must have been brought in by Dorothy Eckford. The question then arises, Is this yellow tinge due to x or y? Evidently it is not due to x, if it were, Dorothy Eckford would be a cream, *i.e.* Mrs. Collier, for the albino form of flowers containing the yellow chromoplasts is cream-coloured. So this yellow flush in Audrey Crier must be due to the factor y in Dorothy Eckford, and as the latter always breeds true to white it must be homozygous for X.

Knowing that Miss Willmott often throws an albino indistinguishable from Dorothy Eckford, I wrote to Mr. ECKFORD, to make assurance doubly sure, and he very kindly told me that my surmise was correct, and that Dorothy Eckford was the albino form of Miss Willmott, which latter may be considered the grandiflora form of Helen Lewis.

Mr. and Mrs. THODAY found among their seedlings a pea of this colour with the factorial composition yyD_d^Dxx (omitting C and R). Now Dorothy Eckford cannot be recessive for x, nor heterozygous, for it always breeds pure white. Consequently, I take the factors of this pea to be $yyDDXX$, and further as it is white, either C or R must be absent, probably C, I think. So the complete formula of Dorothy Eckford will be $ccRRyyDDXX$.

Mr. and Mrs. THODAY find the composition of a blue-pink pea to be $Y_yD_d^DXX_x$, omitting C and R, both of which must be present. I have therefore taken the formula of Countess Spencer as $YyDDXx$, or including C and R, $CCRRYyDDXx$.

As both flowers are thus homozygous for D and R we need not take them further into consideration, and if we bear in mind that the F_1 generation is heterozygous for C, and that consequently we shall get 25 per cent. of whites in F_2 we can omit C from our formula in future, leaving only X and Y.

Now it is obvious that the F_1 generation will be heterozygous for X and Y and, as we have seen above, the colour of the flowers in this generation is the same as that of Audrey Crier. Consequently, we may safely assume that those plants which are heterozygous for X and Y will bear flowers of this colour.

Taking these two factors X and Y respectively, we know that y imparts a yellowish tinge to the sap of those flowers which are homozygous for it, consequently all such flowers will in F_2 be the colour of Audrey Crier; we also know that the development of the yellow plastids occurs only in those that are homozygous for x. These plastids, also, give a yellow tinge to those flowers that are homozygous for x, so that they too will be the same colour as Audrey Crier.

To sum up, three different sets of factors give this colour: 1, $YyXx$; 2, yyX_x^X ; 3, Y_y^Yxx .

Turning again to the original cross Dorothy Eckford \times Countess Spencer, we find that this results in the F_1 generation in four families having the following composition :

I. $CcYyXX$ II. $CcYyXx$
 III. $CcyyXX$ IV. $CcyyXx$

Assuming each family to contain 64 individuals, this gives us a total of 256 individuals of which one quarter will be homozygous for c and consequently white.

The others work out as follows :

I. $\left. \begin{array}{l} 15 YYXX \\ 6 YYXx \\ 30 YyXX \end{array} \right\} 51 Y^Y X^X_x$

These are 'blue pinks,' Countess of Northbrook, and form 20 per cent. of the whole.

II. $\left. \begin{array}{l} 12 YyXx \\ 75 yyXX \\ 30 yyXx \\ 3 YYxx \\ 6 Yyxx \end{array} \right\} \left. \begin{array}{l} (1) \\ 105yy (2) \\ 9xx (3) \end{array} \right\} 126$

These are the salmon-pinks, Audrey Crier, and form 49 per cent. of the whole.

III. 15 $yyxx$

These are Helen Lewis (Thoday $yyDDxx$), and form 6 per cent. of the whole.

IV. 64 cc .

Whites of various composition, Etta Dyke, forming 25 per cent. of the whole.

The percentage then is as follows, out of every hundred plants on an average we have 49 Audrey Crier, 20 Countess of Northbrook, 6 Helen Lewis, and 25 Etta Dyke.

So far this is all theory and book-work, and of no value unless borne out by the actual results. Let us see, then, how my theoretical figures compare with those sent me by Mr. BREADMORE as being the actual results in the field. They are as follows :

	Estimated	Actual
Audrey Crier	49 per cent.	50 per cent.
Countess of Northbrook	20 " "	10 " "
Helen Lewis	6 " "	" a few "
Etta Dyke	25 " "	25 per cent.

I think Mr. BREADMORE must have under-estimated the number of Countess of Northbrook, otherwise his "few" Helen Lewis will amount to 15 per cent. of the whole, or more than there are of Countess of Northbrook. My 6 per cent. corresponds better with the expression "a few," and from my own experience I should say there were more than 10 per cent. pale pink in an average sample of Audrey Crier. When the actual figures given by Mr. BREADMORE are compared with my estimates, one must admit that there is a strong probability, at least, that my deductions are correct and

that the salmon-tinted pink of Audrey Crier is due to the three combinations of factors given above.

Is Audrey Crier then utterly unfixable? I think it would be almost impossible after so many years to select a fixed stock from those now in existence, but if any one were to start again, making the original cross once more and working strictly on scientific lines throughout, I see no reason why he should not obtain a true stock, if, as I suppose, it is homozygous for D and R. For, as we see, there are 75 plants homozygous for y and X and 3 homozygous for Y and x. Reintroducing the factor C they have a composition as follows: 75 $C_{yy}^{C}XX$, and 3 $C_{YY}^{C}xx$. One third

of these will be homozygous for C, so that 26 of the above 78 plants should breed true throughout i.e. roughly 20 per cent. of Audrey Crier in F_2 should breed true, but whether there is any other factor present which I have not taken into consideration and which prevents this, I cannot say.

I put forward this purely theoretical explanation of the colour of Audrey Crier with some diffidence, for I cannot claim to have made a very deep study of Mendelian principles, yet my deductions approach so closely to the actual facts that I am encouraged to think that they are not far from the truth, and I hope that their apparent accuracy may lead some one who has the time and means to demonstrate by experiment their truth or falsity.

ZINNIA ELEGANS.

APPROPOS of the note on *Zinnia elegans* (vol. xxxvi. p. 848) Sir George Watt, K.C.I.E., LL.D., writes: "On the hills around Simla (N.-W. Himalaya), at a height of about 6000 feet above the sea, *Zinnia* has become a wild escape from garden cultivation. It grows in large compact patches on exposed dry grassy slopes. It is there not more than a foot in height, the average hardly half that height. The flowers are double and not more than the size of a double daisy. But the most curious point is that all the flowers, without any exception, are uniformly of a dirty brick-red colour—a shade never seen by me in the cultivated Zinnias of India or anywhere else. I don't recollect to have seen any abnormal forms, except that it is not uncommon to find the scape flattened out upwards and bearing more than one flower-head.

"By way of contrast it may be added that the Dahlia has also run wild in the same neighbourhood. It frequents damp wooded glades of Oak and *Rhododendron arboreum*, but the flowers have all become single (often very large and beautiful) and of every shade from pure white to the deepest maroon and purest yellow. They are, in fact, the glory of the Simla glades at the beginning of the rains—that is to say, they come into bloom early in June or at least one month before the carefully nurtured plants of the adjacent gardens. Moreover, they never wander so far afield as the Zinnias, which may be met with assuming the condition of a troublesome weed of field cultivation."

HORTICULTURAL NOMENCLATURE.

A CONGRESS for the consideration of the nomenclature of garden plants was held in April and May 1910 at Brussels, at which the Royal Horticultural Society was represented by Dr. A. B. Rendle, M.A., F.R.S., and Mr. E. A. Bowles, M.A., F.L.S., and the rules of nomenclature adopted at the Congress have recently been published. Prior to the Congress a list of questions was submitted to various authorities in different countries and their replies formed the basis for discussion at the Congress.

Below we print a translation of

- (1) the questions submitted, with the replies sent by the Society, and
- (2) the rules adopted by the Congress.

It will be seen that the articles adopted by the Congress follow in the main the recommendations of the Society, though here and there they deviate somewhat from them. The rules adopted will govern the nomenclature of garden plants, while the questions and replies given to them will serve to some extent as a commentary upon the rules, and will show some of the main points that have come under consideration.

1. QUESTIONS CONSIDERED BY THE BRUSSELS HORTICULTURAL CONGRESS WITH REPLIES SENT BY THE ROYAL HORTICULTURAL SOCIETY.

1. *General Observations on Nomenclature from the point of view of Horticulture.*—As an outcome of the International Botanical Congress of Paris in 1900, an International Commission was requested to prepare a scheme of nomenclature which should serve as a basis for discussion at the International Congress on Botanical Nomenclature to be held in Vienna in 1905. The Commission was chosen from those botanists who were considered most competent to deal with the question of nomenclature.

Thirty-one members took part in the preparation of the scheme, Germany having four representatives, North America two, Great Britain and her Colonies two, Austria-Hungary five, Belgium two, France four, Holland two, Italy three, Russia two, Sweden one, Switzerland four.

The scheme was thoroughly discussed at the Vienna Congress and rules were formulated and published in German, English, and French under the title *Règles internationales de nomenclature botanique*.*

It is not to be supposed that horticulturists dream of turning aside from these "Rules," but it will no doubt be found that some matters

* Published by Fischer, Jena; the English part has been issued separately by Messrs. West, Newman & Co., price 1s.

which from the point of view of pure botany are of very secondary importance, are exceedingly important from the horticulturist's point of view, and these may not have been treated in the "Rules" in a sufficiently complete manner. This applies particularly to the nomenclature of *horticultural varieties* and to the nomenclature of *hybrids*. The nomenclature of artificial hybrids, now so important in the garden, appears scarcely to have been touched upon.

Should the Rules elaborated at the Vienna Botanical Congress be adopted for horticultural use, with the additions necessary to make them apply to horticultural varieties and hybrids?

Society's Reply.—

The Royal Horticultural Society of London considers it essential that the rules adopted by the Botanical Congress of Vienna, 1905, so far as they apply to names of species and to groups of a higher order, should be strictly binding upon horticulturists; but they agree that the articles dealing with horticultural varieties and with hybrids of cultivated plants, require to be supplemented in order to meet numerous cases not now provided for.

Further, they consider that the same principles which apply to the names of larger groups should apply equally to the names of these, and that in any code of rules for the guidance of horticulturists these principles should be incorporated.

2. *Nomenclature of Varieties of Species.*—*Règles de nomenclature botanique.* Art. 30.—"Forms and half-breeds among cultivated plants should receive fancy names, in the common language, as different as possible from the Latin names of species or varieties. When they can be traced back to a species, a sub-species or a botanical variety, this is indicated by a succession of names."

[Example: *Pelargonium zonale* 'Mrs. Pollock.']

Note that Latin is proscribed for names of the plants referred to.

Is it desirable to modify or amplify this article?

Reply.—

Art. 30 should be modified so that Latin names for horticultural varieties are not proscribed. It might read:—

"Forms of and crosses among cultivated plants should receive names which should follow those of the species, sub-species, or botanical variety from which they have been derived."

The article should be followed by recommendations:—

1. Names of Latin form should be restricted to forms of plants which are not recognized as "florists' flowers."

E.g. *Alyssum maritimum nanum*.

Ilex aquifolium Forst.

Saxifraga granulata flore pleno.

2. Forms of "florists' flowers" and vegetables should receive fancy names or names in the vulgar tongue. Where they can be traced back to a species they should follow the name of the species, but where they are derived from the crossing of several species indis-

criminally they should follow a group name, usually that of the genus, slightly modified. Well-recognized common names may take the place of the generic names when it appears desirable or convenient.

E.g. (a) Plants derived from one species.

Cyclamen persicum 'Salmon Queen.'

Pelargonium zonale 'Mrs. Pollock.'

Papaver orientale 'Lady Roscoe.'

Runner Bean 'Scarlet Emperor.'

(b) Plants derived from the crossing of several (or two) species.

Rose 'Grace Darling.'

Viola 'Blue Boy.'

Gladiolus × *Childsii* 'Splendour.'

It is often convenient and very desirable to indicate the group of forms to which the plant belongs in the name.

E.g. French Bean 'Golden Waxpod'; F.b. 'Yellow Waxpod,'

F.b. 'Long Waxpod.'

Sweet Pea 'Countess Spencer'; 'Blush Spencer'; 'Primrose Spencer'; 'Nora Unwin'; 'Elsie Unwin,' etc.

3. Should the names of varieties expressed in the vulgar tongue in accordance with Article 30 be fixed, i.e. adopted without modification in all languages, or should they be translated into each language where they are used: into French in French books and catalogues, into English in English books and catalogues, and so on.

Reply.—

The name applied in the country of origin should be retained by the variety throughout and should not be translated when it is transferred into another language.

4. Should the names of varieties be expressed in one or two words, or should any arbitrary number of words be used? Is any recommendation to be made upon this subject?

Reply.—

The varietal name should be as short as possible and should not exceed two words. It is sometimes very desirable to use group names, see under sec. 2.

5. *Publication of Horticultural Varieties.*—*Nom. Bot.* Art. 35.—“Publication is effected by the sale or public distribution of printed matter, or indelible autographs.

“Communication of new names at a public meeting, or the placing of names in collections or gardens open to the public, does not constitute publication.”

What shall constitute valid publication from the point of view of horticultural priority,

1. of a new variety:

(a) described with or without a figure;

(b) or figured without description in an horticultural catalogue.

2. of a new variety exhibited at a Show and
 - (a) mentioned;
 - (b) not mentioned in the periodical reviews;
3. or shall other modes of publication be permitted?

Reply.—

The publication of a name of a horticultural variety or hybrid, etc., is by

1. (a) the description of the form, with or without a figure in the recognized horticultural periodicals or publications of scientific societies of any country, and

1. (b) by the publication with an adequate description in the catalogue of a nurseryman, and

2. (a) by the exhibition and subsequent description in the report of a horticultural meeting, or the description in the report of official trials of horticultural varieties, but

2. (b) the mere exhibition of a variety without its subsequent description shall not be regarded as valid publication.

3. No other mode of publication shall be recognized.

Recommendation.—All friends of horticultural progress will take care that adequate descriptions of forms appear in the horticultural periodicals and are not buried in nurserymen's catalogues.

6. *Nom. Bot. Art. 39.*—"The date of a name or of a combination of names is that of their effective publication. In the absence of proof to the contrary, the date placed on the work containing the name or combination of names is regarded as correct. After January 1, 1908, the date of the publication of the Latin diagnosis only can be taken into account in questions of priority."

Is it desirable to maintain the necessity for a Latin diagnosis for the valid publication of a horticultural variety?

Or should the publication of the characters be made in one of the most commonly spoken languages, or if in one language only, in which?

Reply.—

The date of effective publication of a name is the date upon which the article containing the name and description was issued to the public. The Art. 39 so far as it applies to the date is agreed to, but the exigence of the Latin diagnosis should not be maintained; the description is admissible in any language whatever.

Recommendation.—It would, however, be very greatly to the advantage of the horticultural world if the description were published in English, French, German, Italian, or Spanish.

7. *Hybrids between Species of the same Genus.*—*Nom. Bot. Art. 31.*—"Hybrids between species of the same genus, or presumably so, are designated by a formula and, when it appears useful or necessary, a name.

The formula consists of the names or specific epithets of the two parents in alphabetical order and connected by the sign \times . When

the hybrid is of known experimental origin the formula may be made more precise by the addition of the signs ♂ and ♀.

The name, which is subject to the same rules as the names of species, is distinguished from the latter by absence of an ordinal number and by the sign × before the name."

Example: × *Cattleya Brabantiae* (*C. Aclandiae* ♂ × *C. Loddigesii* ♀).

Frequently the sign × is placed before the specific name: *Cattleya* × *Brabantiae* (*C. Aclandiae* × *C. Loddigesii*).

Sometimes the sign × is omitted: *Cattleya Brabantiae* (*C. Aclandiae* × *C. Loddigesii*).

Which of these three methods of writing the name is to be recommended, or should the matter remain optional?

Reply.—

The name of an undoubted hybrid between species of the same genus should have the sign of hybridity between its generic and specific names, otherwise the nomenclature should follow Art. 31 of the "Rules of Nomenclature."

8. In what language should the specific name of a hybrid be expressed?

Most authors express the specific name of hybrids either in Latin or in some generally familiar language. Others consider this name should be in Latin; thus, Messrs. Rolfe and Hurst ("Orchid Study-book," 1909) translate into Latin all specific names expressed in other languages.

Example: *Cattleya* × 'Princesse Clémentine' becomes in their work *C. × Clémentinae*.

Reply.—

The specific name of such hybrids should be of the Latin form.

9. Should the specific name of a hybrid be expressed as a single word, or may it contain more words?

Certain authors, as Messrs. Rolfe and Hurst ("Orchid Study-Book"), invariably adopt only one word, even when the name was published in Latin.

Example: *Cattleya Memoria Bleui* becomes according to them *C. × Bleui*.

Reply.—

These specific names should consist of a single word.

10. If the specific names of hybrids are to be expressed in the vulgar tongue, should names consisting of three, four, five, or sometimes more words be permitted?

Example: *Cattleya* × 'Mademoiselle Marie Henriette de Wavrin' ("Rev. de l'Hort. Belge," 1905, p. 272);

Cypripedium × 'Mademoiselle Germaine Sellier de Gisors' ("Jour. Soc. Nat. d'Hort. de France," 1893, p. 659);

Cypripedium × 'Souvenir de Madame Jules Dupré' (*Ibid.* 1894, p. 583);

Cypripedium × *hybridum* 'Frau Geheimrat Borsig' ('Gartenflora,' 1892, p. 393, t. 1501).

Reply.—

See 8 and 9 above.

Note.—None of the foregoing rules and recommendations should be retrospective in their action where their application would require a change in an existing name, for such application would be likely to interfere greatly with commerce and with garden nomenclature of all kinds, and produce confusion worse confounded.

This does not, however, preclude the application of the principle of priority, and the resultant sinking of many names as synonymous.

11. *Varieties of hybrids.*—The following rule is generally adopted by English horticulturists, and is strictly observed by MM. Rolfe and Hurst in their "Orchid Stud-Book," 1909:

All the hybrids arising from the crossing of the same two species carry the same specific name. All forms proceeding from the same crossing or from successive crossing of varieties of these two species are attached as varieties to the same specific name.

Should this rule, which seems indispensable in order to avoid the creation of an incalculable number of useless specific names, be adopted?

Thus, in 1894, following the flowering of the first crossing resulting from the fertilization of *Cypripedium Spicerianum* by *C. × nitens*, different plants of that single crossing received sixteen distinct specific names. Subsequently twenty other names were given to products of the same cross.

In applying the foregoing rule these 36 names ought to have been assigned as varietal names under the same specific name (*C. × aureum*).

It is to be remarked that, in spite of the application of this rule, MM. Rolfe and Hurst still admit 758 specific names for hybrids obtained up to January 1, 1909, in the genus *Paphiopedilum*, a sub-division of the old *Cypripedium*.

Reply.—

The rule enunciated in the second paragraph of the section should be strictly adhered to. But when the parents of a hybrid are transferred to a new (or to another) genus, then the name of the hybrid follows, and the specific name would follow the rules applying to species under similar conditions.

12. In what language should the names of varieties of hybrids be expressed? Logically, the same language should be permitted as for varieties of species (see Question 2).

The committee nominated by the Société Nationale d'Horticulture de France for the study of the nomenclature of intergeneric orchid hybrids recommends:

"Que les noms des variétés doivent toujours être des noms commémoratifs ou exprimant une dédicace, et non des noms latins,

de manière à éviter les confusions regrettables avec ceux employés par les botanistes pour la dénomination des espèces." (" Jour. de la Soc." May 1909, p. 320.)

Reply.—

Apply the rule enunciated in Section 2, i.e. that varietal names may be either of the Latin form or in the vernacular.

13. Cross-breeds (Crosses between varieties or forms of the same species).

Nom. Bot. Recommendation XVII. " Half-breeds, or presumably such, may be designated by a name and a formula. The names of half-breeds are intercalated among the sub-divisions of the species and preceded by the sign \times . In the formula, the names of the parents are in alphabetical order."

Is any modification desirable in this recommendation?

Reply.—

See Question 2.

14. *Ternary hybrids or hybrids of a higher order.* (Crosses between hybrids of the same genus.)

Nom. Bot. Art. 33.—" Ternary hybrids, or those of a higher order, are designated, like ordinary hybrids, by a formula, and when necessary by a name."

Example: *Cypripedium* \times *Ainsworthii* (C. \times *Measuresianum* ♀ \times C. \times *Spicerianum* ♂).

In practice should the use of a formula alone be allowed as is permitted by Article 33, or may a name only be used, or is it desirable to use both a formula and a name?

Reply.—

A name (following the principles laid down under Questions 8 and 9) should be given and a formula when possible.

15. *Bi-generic hybrids.*

I. *Nom. Bot.* Art. 32.—" Intergeneric hybrids (between species of different genera), or presumably such, are also designated by a formula, and when it seems useful or necessary by a name.

" The formula consists of the names of the two parents in alphabetical order and connected by the sign \times ."

" The hybrid is associated with the one of the two genera that precedes the other in alphabetical order. The name is preceded by the sign \times ."

II. Rule adopted long since by the Royal Horticultural Society of London:

" Artificial hybrids between genera: The generic name is of the Latin form, being a combination of the names of the parents, and the specific name is also Latin separated from the former by the sign of hybridity \times ."

Example: 1st system.—*Brassavola glauca* \times *Laelia cinnabarina* (formula alone), or *Brassavola* \times *Clio* (B. *glauca* \times *Laelia cinnabarina* name and formula).

2nd system.—*Brassolaelia* × *Clio* (*B. glauca* × *L. cinnabarina*).

Which of the two systems should be adopted?

N.B.—The Committee on nomenclature of orchids appointed by the Société Nationale d'Horticulture de France recommends:

"Que les noms génériques composés déjà employés pour les hybrides bigénériques, et devenus d'usage courant, doivent être conservés." ("Jour. de la Soc." May 1909, p. 319.)

Reply.—

In horticultural practice, the rule adopted by the Royal Horticultural Society as given above should be adopted, and the second system of writing the name should be adopted.

E.g. *Laeliocattleya* × *carnea*.

Epilaelia × *splendens*.

16. If the English system of writing the names of bigeneric hybrids be adopted, should the name be written in a single word, or in two words united by a hyphen?

Two methods are in use: one writes *Laeliocattleya*, the other *Laelio-Cattleya*; but it would be better to adopt a uniform orthography.

Reply.—

The hyphen should be omitted.

17. *Multigeneric hybrids*.

I. *Nom. Bot.*—This case is not specially provided for. By an extension of Article 32 (see Question 15), the hybrid would be referred to the genus entering into its composition which comes first in alphabetical order.

II. The Royal Horticultural Society of London admits for three genera in combination the generic names:

Brassocattlaelia, for *Brassavola*, *Cattleya*, *Laelia*.

Sophrocattlaelia, for *Sophronitis*, *Cattleya*, *Laelia*.

III. Proposition of Mr. C. T. Druery, of Acton: abridge these names further by taking only one syllable, or the same part of one syllable, from each generic name:

Brassocattlaelia becomes *Brassattlia*,

Sophrocattlaelia becomes *Sophrattlia*.

(See "Gard. Chron." March 13, 1909, p. 171; "Orchid Review," xvii. 1909, p. 101.)

IV. The Committee appointed by the Société Nationale d'Horticulture de France for the study of the nomenclature of integeneric orchid hybrids recommends:

"Que pour les hybrides dont les parents appartiennent à trois ou à un plus grand nombre de genres, on devra prendre seulement le nom générique de la plante porte-graines (plante-mère). Le nom de l'hybride devra toujours être suivi de la formule indiquant la parenté;

"*Epilaelia* Jupiter (*Epilaelia* Charlesworth ♀ *Brassocattleya* Le superbe ♂)."

"Jour. Soc. Nat. d'Hort. de Fr." May 1909, p. 320.

Which of these systems is to be preferred, or can a better one be devised?

Reply.—

The following Rules are quoted from our Sub-Committee's recommendations (see "Jour. R.H.S." xxxvi. (1910) p. 407).

Rule 4.—Future multigeneric hybrids (combining three or more genera) should be given a conventional generic name consisting of the name of some person eminent as a student or as a grower of orchids, followed by the termination 'ara.'

Rule 5.—A separate generic name should be coined for each distinct combination of genera. Thus:—

Brassocattleya × *Epilaelia*, and
Brassodendrum × *Brassocattleya*, and
Brassolaelia × *Epicattleya*, and
Brassolaelia × *Epidendrum*,

and all other possible combinations of those four genera would be designated by one name, e.g. *Adamara*, while a second generic name, e.g. *Linneara*, would need to be coined for *Dialaelia* × *Brassocattleya*, and this would stand for all combinations of the four genera *Diacrium*, *Laelia*, *Brassarola*, and *Cattleya*.

18. *Publication of hybrids.*

In order for a new hybrid to be considered published is it to be recommended that the same rules should apply as for the valid publication of varieties of true species (see Question 5); or would it be sufficient, for example, to give a name and a formula—that is, to make known the parentage?

Reply.—

The publication of the names of hybrids should be governed by precisely the same rules as those of varieties under Section 5.

19. Are there any other details relative to horticultural nomenclature which it would be useful to discuss at the Congress?

20. In horticultural catalogues it frequently happens that the same plant is found under two or more names, which are only synonyms. Certain catalogues also are full of orthographical errors.

Would it not be useful to publish an Index of all the species which have been introduced into cultivation giving their correct names as much with a view to nomenclature as to orthography, with their synonymy? This would serve as a guide to the compilers of catalogues and in correct labelling, and would prevent buyers being misled.

If an Index is considered desirable, what other information should it contain besides the names?

Reply.—

Such an index would be infinitely useful. The name of the species or variety according to the above rules, with its place and date of publication, and where possible a reference to a good figure, with indication of synonymy would be required. A 'splitter's' point of view of species should be adopted.

II. RULES OF HORTICULTURAL NOMENCLATURE ADOPTED BY THE SUBSECTION ON NOMENCLATURE AT THE INTERNATIONAL CONGRESS AT BRUSSELS, 1910.

Article I.—Horticultural nomenclature is based upon the rules of Botanical Nomenclature adopted by the International Congress of Botany, held at Vienna in 1905. The Horticultural Congress accept all the principles, and rules, so far as they apply to names of species and groups of a higher order, but adopt the modifications and additions contained in the following Articles for horticultural varieties and hybrids of cultivated plants.

Among the principles which serve as a basis of these rules it is particularly important not to lose sight of the following:—

1. In all schemes of nomenclature the essential principles are: (a) to aim at fixity of names; (b) to avoid or discourage the employment of forms or names which are liable to produce errors or uncertainties, or to bring about confusion. Next (c) it is important to avoid the creation of useless names. Other considerations such as absolute grammatical exactitude, regularity, or euphony in names, more or less general use, consideration for persons ("authority"), etc., notwithstanding their undisputed importance, are relatively subsidiary.

2. Any usage contrary to the rules may not be maintained if it entails confusion or error. When any usage of this nature is not greatly inconvenient, it may justify exceptional treatment; it is necessary, however, to guard against extending or imitating it. Finally, in default of rules, or if the application of the rule is doubtful, any established usage becomes lawful.

3. Each natural group of plants can only carry in science a single valid designation, viz., *the most ancient*, provided it conforms with the rules of nomenclature.

4. The designation of a group by one or several names, has not for its object the expression of the characters or history of the group, but is to give a means of understanding one another when wishing to speak of it.

5. No one has the right to alter a name or combination of names without weighty reasons founded upon a very thorough knowledge of the facts or upon the necessity of abandoning a nomenclature contrary to the rules.

6. Botanical and horticultural nomenclature commences at the year 1753 for all the groups of vascular plants.

Article II.—It is necessary in naming horticultural varieties of species and simple forms to employ the complete names of the species with the name of the author.

The employment of Latin in naming horticultural varieties is authorized only when the character of the plant is expressed, e.g., *nanus*, *fastigiatus*, etc. The use of Latin proper names for such varieties is proscribed.

The names of horticultural varieties must always be written in

Roman characters. [E.g. *Alyssum maritimum compactum*, *Pelargonium zonale* 'Mrs. Pollock'; *Papaver orientale* 'Salmon.']

Article III.—When the names of varieties expressed in the vulgar tongue are transferred to other languages they must not be translated, but must be preserved in the language in which they were originally published.

Article IV.—The names of varieties should be expressed as far as possible in a single word; and the employment of not more than three words is permitted as a maximum.

The same rule applies to the specific names of hybrids.

Article V.—The publication of a description of a variety in a dated horticultural catalogue is valid, but the mention of a variety without description in a catalogue, or in the report of an exhibition, is not valid publication, even if a figure is given.

It is desirable that descriptions of new varieties published in horticultural catalogues, should also be published in periodical horticultural papers.

Article VI.—In order to be valid, the description of a new variety or of a new hybrid must be drawn up either in German, English, French, Italian or Latin.

Article VII.—Hybrids between species of the same genus, or presumably such, are designated by a name and a formula.

The name is distinguished from the names of species by the sign \times placed before the generic name.

The formula, placed between brackets, consists of the specific names of the two parents, connected by the sign \times , the name of the seed-bearing parent being placed first. The seed-bearing parent should be indicated by the sign φ .

Article VIII.—The specific name of a hybrid may be expressed in Latin or in any language that is written in Roman characters.

[Thus both forms, \times *Cypripedium nitens* and \times *C.* 'Minotaur,' are permissible.]

Article IX.—All hybrids obtained by crossing the same two species must carry the same specific name. All forms arising from the same cross, or from successive crossings of varieties of these two species, should be connected as varieties, with the same specific name.

[Thus all plants arising from the crossing of *C. Bowringiana* and *C. Schilleriana* must be called \times *C. lucida* no matter how they may differ. The various forms will be given varietal names.]

Article X.—When the parents of a hybrid are transferred into another genus, or into a new one, the name of the hybrid follows, and the specific name is subject to the rules of priority, or others applicable to species under similar conditions, conforming with Article 48 of the Rules of Botanical Nomenclature.

Thus, for example, if we admit the genus *Paphiopedilum*, \times *Cypripedium Vervaeianum* Rehb. f. in *Gard. Chron.*, 1888, I., p. 712 (\times *C. Euryale* Veitch. *Man. Orch.*, iv., p. 83, 1889), becomes \times

Paphiopedilum Vervaeianum and not \times *P. Euryale* Stein *Orch.*, p. 466 (1892).

Article XI.—The names of horticultural varieties of hybrids should always be expressed in the vulgar tongue.

Article XII.—Cross breeds (crosses between varieties or forms of a single species) and ternary hybrids or those of a higher order (crosses between species of the same genus) are designated by a name or a formula, following the same rules as for ordinary hybrids. (Art. VII.)

For ordinary use and in the case of the offspring of well-known hybrids, the formula may be omitted, and the name alone serve.

Article XIII.—Bigeneric hybrids are also designated by a name and a formula.

The generic name is formed by the combination of the generic names of the parents into a single word composed as far as possible so that the names of the two genera entering into the composition of the hybrid are easily recognizable; it is preceded by the sign \times and followed by a specific name.

The specific name is subject to the same rules as are those of ordinary hybrids (Arts. IV. and VIII.).

The formula is written conformably with Article VII.

Article XIV.—Multigeneric hybrids receive a conventional generic name preferably that of a distinguished man, to which is added the termination *ara*. A distinct generic name will be formed for each different combination of genera. Thus all combinations of the genera *Brassavola*, *Cattleya*, *Laelia*, and *Epidendrum*, no matter in what order they may be intercrossed, receive the same generic name which would be, for example, *Linncara*.

As an exception the names of the trigeneric hybrids *Brassocattlaelia* and *Sophrocattlaelia*, already in use, are retained.

Article XV.—For a new hybrid to be considered as published it should be named according to the rules, the formula of its parentage and a description of the hybrid itself being given.

Publication is effected in the same manner as with horticultural varieties of species, as set out in Articles V. and VI.

Article XVI.—In any case where the rules of horticultural nomenclature would be actually contrary to practice permitted or tolerated at present, they would not have a retrospective action.

[We have to acknowledge our indebtedness to M. A. Cogniaux, F.L.S., the Secretary of the Section of the Congress on Nomenclature, who compiled these rules, and to the Editor of *Le Bulletin de la Société Royale de Botanique de Belgique*, where they were first published, for kind permission to translate and publish them here.]

AN INDEX TO ILLUSTRATIONS OF APPLES.

Compiled by E. A. BUNYARD, F.R.H.S.

THIS Index has been compiled to assist those engaged in pomological research. The excellent figures of fruits which exist are often overlooked on account of their inaccessibility and the time demanded for a search through each separate volume for the desired illustration.

SYNONYMS.

The question of synonyms has not been touched, except in cases where it is quite obvious, as, for example, 'Duchess of Oldenburgh'; synonyms, 'Barovitsky,' 'Borovinka,' 'Charlanowska,' &c.

INDEXING.

The difficulties in connexion with indexing are many, and, after consideration of the various systems, class-grouping has been adopted. Pippins, for example, will all be found under the heading "Pippin," which, where necessary, is subdivided, as "Pippin, Golden," "Pippin, Golden, Hughes," &c. The bringing together of varieties and their sub-varieties is thus possible.

LIST OF WORKS INDEXED AND REMARKS ON THE PLATES.

Abhandlung von der Obstbaumen. Johann Kraft. 1792.

Plates of fair merit, showing foliage and wood. Apples are not contained in this work. Names in German and French.

Album de Pomologie. A. Bivort. 1848 *et seq.*

Drawing and colouring variable, the later volumes showing much improvement. Fruit, spurs, and foliage shown.

Annales de Pomologie Belge et Etrangère. Par la Commission Royale de Pomologie. 1853 *et seq.*

Carefully drawn, but not so well coloured. Foliage and spurs included.

Der Deutsche Obstgärtner. Sickler. 1794. 22 vols.

The date of this work gives value to the illustrations. The drawing and colouring are of course somewhat crude. The fruit only is shown in most cases.

Deutsche Pomologie. W. Lauche. 1882.

Plates good. No foliage, but flowers well figured in nearly all cases.

Flora and Pomona. Mackintosh. 1827.

The drawing and colouring of the plates are of medium merit.

Fruits of America. F. M. Hovey. 1851. 2 vols.

The plates are lithographs of no great merit. Young wood, spurs, and leaves are shown.

Herefordshire Pomona. Henry Graves Bull and Dr. Robert Hogg. 1876-85.

The colouring is fairly good; small fruiting spurs are generally shown, but no young wood. The leaves are not drawn with any real accuracy, and are not always shown.

La Flore et Pomone Française. M. J. St. Hilaire. 1828.

The plates are third rate.

Le Jardin Fruitier. Noisette. 1821 (1st Ed.)

Leaves, flowers, and seeds are shown as well as fruits in most cases. Apples are not well-coloured.

Le Verger. A. Mas. 1872-1883.

Plates carefully drawn and moderately-well coloured.

Magyar Pomologia. Etienne Molnar. 1900-1909.

Large folio plates of artistic merit illustrating fruits of Hungarian origin and showing foliage. Text in Magyar and French.

Pomologia. Johann N. Knoop. 1758.

Fruit alone figured. Drawing fair, colouring rather crude, but by no means mechanical. Important as an early book with coloured figures.

Pomologie de la France. Par le Congrès Pomologique. 1869 *et seq.*

Young wood and foliage shown with the fruits. Colouring and drawing careful and generally good.

Pomologia Britannica. J. Lindley. 1841. 3 vols.

The fruits, leaves, and wood are generally shown, and are on the whole well coloured. The drawing is excellent. This was first published in 1828-30 as the *Pomological Magazine* in 3 vols.

Pomona Franconica. Jean Mayer. 1776.

Plates fair in colour and careful in drawing, showing that details of the eye, core, &c., were well appreciated. Text in German and French. French titles are given where the name is in that language.

Pomona Herefordiensis. Knight. 1811.

Plates showing fruit, leaves and wood in the best style.

Pomona Italiano. Giorgio Galesio. 1817.

A large and important work, but the execution of the plates is very unequal. Some are of high merit, and many are extremely bad. Figs are the important feature of this work, and are well delineated in all cases.

Pyrus Malus Brentfordiensis. Hugh Ronalds. 1831.

The fruits alone are shown, but with great accuracy of detail in drawing and colour. Without doubt the finest reproductions of apples published in this country.

Svensk Pomona. Olaf Eneroth. 1864-1866.

Plates not numbered, and so are given in order of appearance. They are coarsely coloured and badly drawn. It is included for the sake of a few Swedish varieties not depicted elsewhere.

The Apples of New York. S. A. Beach. 1905. 2 vols.

The fruit alone is figured, the process of reproduction being three-colour work of merit, but it suffers from the disadvantages of all photographic work—the lack of emphasis of important detail.

Traité des Arbres Fruitières de Duhamel du Monceau. Poiteau et Turpin. 1835.

This fine work stands first for completeness, and the plates are of great merit. The colouring of the fruits is good, but the leaves are not well done.

Transactions of the Royal Horticultural Society. London. Series 1 and 2. 1805-1848.

The colour-work and drawing of the plates are magnificent. Foliage and wood are shown in many cases.

ABBREVIATIONS.

Abbreviations used.	Full title.	Author.
Bivort . . .	Album de Pomologie . . .	Bivort.
Duham. . . .	Traité des Arbres Fruitières . .	Duhamel.
Fl. Pom. Fran. .	Flore et Pomone Française . .	St. Hilairo.
Her. Pom. . . .	Herefordshire Pomona . . .	Bull and Hogg.
Hort. Trans. . .	Transactions of the Royal Horti- cultural Society . . .	—
Hov. Fr. Am. . .	Fruits of America . . .	Hovey.
Knight	Herefordiensis Pomona . . .	Knight.
Knoop	Pomologia	Knoop.
Kraft	Abhandlung von der Obstbaumen .	Kraft.
Lauche	Deutsche Pomologie	Lauche.
Lyons	La Pomologie de la France . . .	—
Lind. Pom. Brit.	Pomologia Britannica	Lindley.
Mac. Fl. Pom. . .	Flora and Pomona	Mackintosh.
Mag. Pom. . . .	Magyar Pomologia	Molnar.
Mayer	Pomona Franconica	Mayer.
New York . . .	The Apples of New York . . .	Beach.
Noisette	Le Jardin Fruitier	Noisette.
Pom. Belg. . . .	Annales de Pomologie Belge et Etrangère	—
Pom. Ital. . . .	Pomona Italiana	Gallesio.
Pyr. Brent. . . .	Pyrus Malus Brentfordiensis . .	Ronalds.
Sickler	Der Deutsche Obstgärtner . . .	Sickler.
Svensk Pom. . .	Svensk Pomona	Eneroth.
Verger	Le Verger	Mas.

* * * * *

This index will be followed by similar ones dealing with Pears, Plums, and other fruits. The compiler hopes that inaccuracies, almost unavoidable when dealing with so large a number of references, may be pointed out to him.

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 — — Autumn. Pyr. Brent., 18.
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 — — — Lauche, II, 75.
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 — — — Her. Pom., 65.
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THE MUTATION THEORY:

A CRITICISM AND AN APPRECIATION.

By REV. PROFESSOR G. HENSLow, M.A., F.L.S., V.M.H.

THIS important volume,* consisting of 674 pages, with numerous illustrations in the text and six coloured plates, is a great fund of facts, inferences, and conclusions, and speaks volumes for the author's enthusiasm to discover Nature's laws, coupled with immense painstaking in experiments and observations.

It is divided into three parts: I. The Origin of Horticultural Varieties. II. The Origin of Eversporting Varieties. III. The Relations of the Mutation Theory to Other Branches of Inquiry.

In previous notices of Prof. de Vries' two books—"Species and Varieties: their Origin by Mutation,"† and "The Mutation Theory," Vol. I.‡—I pointed out that the work did not appear to advance anything new to science, but only added to the nomenclature. Mutations stand for some uncertain amount of variation, greater than the usual fluctuating variations seen in "individual differences." The latter are mostly trivial, such as between the peas in a pod, slightly different shapes and sizes of leaves on one and the same tree, etc. These Wallace regards as merely "non-specific or developmental characters."§

As a rule they have no permanent value, since they are due to local and temporary differences in their degrees of nourishment. But, if any such happen to become *constant by heredity*, it may be utilized as a systematic variety or "elementary species" or "mutation." Such, for example, are the numbers of black dots on the petals of species of *Hypericum*, which are mentioned by systematists as diagnostic characters. Similarly the four petals instead of five is a specific character in *Tormentil*. Again, if a plant be accidentally half-starved, it will readily recover itself with more water; but let it remain for generations in the same poverty-stricken conditions its "starvation-characters" will become fixed and hereditary, so that it will perhaps come to be named *depauperata*; such may be seen in *Sagina apetala*, *Nardus stricta*, &c.

The theory of mutations as advocated by Professor de Vries is often referred to as something new, and as an alternative to Darwin's; but Mr. Th. Meehan, of Germantown, Philadelphia, advocated the same thing nearly forty years ago. His paper|| begins: "*Natura non*

* *The Mutation Theory. Experiments and Observations on the Origin of Species in the Vegetable Kingdom*. Vol. II. *The Origin of Varieties by Mutation*. By Prof. Hugo de Vries. Translated by Prof. J. B. Farmer and A. D. Darbishire. viii.+674 pp. (Kegan Paul, Trench, London, 1911). 18s. net.

† *Journ. Roy. Hort. Soc.*, xxxi. 1907.

‡ *Idem.*, xxxvi. 1910.

§ *Fortnightly Review*, 1895, p. 44.

|| *Proc. of the Amer. Assoc. for the Advancement of Science*, 1874.

facit saltum has been accepted as a grand canon by most naturalists, and the evident absence of connecting-links has been thought fatal to theories of evolution. My studies in plant life lead me to the belief that one form will spring from another essentially different, and without any gradual or insensible modifications uniting them."

His conclusions are remarkably similar to those of Professor de Vries, mentioned in the present and preceding volumes. They are the following "truths" as Mr. Meehan called them:—

1. Morphological changes in individual plants are by no means always by gradual modifications.

2. Variations from specific forms follow the same law.

3. Variations are often sudden, and also of such decided characters as to be deemed generic.

4. These sudden formations perpetuate themselves, and act in all respects the same as forms which spring through gradual modifications.

5. Variations of similar character occur in widely separated localities.

6. Variations occur in communities of plants simultaneously by causes affecting nutrition, and perhaps by other causes.

Arguing from these, new and widely distinct species may be suddenly evolved from pre-existing forms without the intervention of connecting-links.

Hence two facts are required for mutations—some markedly strong varietal characters, and constancy by heredity.

How and when do mutations arise? Professor de Vries is under the impression that they do so periodically; that plants have periods of mutation and periods of constancy. Then, variations come suddenly, in every direction, while constancy may fix them as elementary species if they do not differ much from their parents. They arise, according to his view, in consequence of some *latent* property in the plant suddenly coming into action. I have already called attention to his apparent unfamiliarity with the conclusions of ecological experience, and it is equally apparent in this second volume. Though he has inserted a section on the "Explanation of Adaptation,"* he says nothing on Adaptations being the "definite results of the direct action of changed conditions of life" (Darwin).

He admits that the mutation theory "will explain adaptations just as completely, or rather just as incompletely, as the present view," by which he means Darwinism; yet he concludes by saying: "All the difficulties . . . besetting the current view disappear if we substitute mutability for fluctuating variability as the source of the origin of species." Moreover, he has much to say upon the effects of environmental conditions in encouraging, or otherwise, abnormalities when they have once put in an appearance. The capacity for making them may lie dormant, as in the "atavists" in his experiments, and subsequently reappear in the offspring. Professor de Vries does not appear to suggest any cause for his idea of periodicity of mutations; but it is at once explained by the fact that variations only arise when new external conditions are

present; so that the flowers of the wreaths found in Egyptian tombs are like those of to-day, because the climate of Egypt has not altered. But when he introduced his *Oenotheras* from very sandy soil to a richly manured garden, they at once began to vary, or "break," as gardeners say. He alludes to geological periods; but the frequent gaps by the loss of strata and our ignorance of the organisms missing, invalidate any conclusions of geological periodicity in all kinds of organisms. In the short section on "The Explanation of Adaptations" referred to he says: "This problem lies outside the scope of the present book, which is only concerned with the empirical foundations of the theory of descent"; and he holds to the "operation of natural selection"; so it would seem that he is unaware of Darwin's alternative, in which "no selection of any kind is required." *

We now come to the most important part of the book, viz., his elaborate experiments, with their tabulated results, on the degrees of fixation by heredity, given in percentages, of a number of teratological cases.

The total results may be concentrated in the fact that when the "monstrosity" has once appeared nourishment tends to increase and establish the malformation. It then possesses an inherent tendency to be hereditary. Lastly, the percentage varies from zero to nearly a hundred. Professor de Vries attributes the first appearance to latent causes which are unknown.

In the third chapter the author states that new species arise—

A. By the formation of new characters.

B. Without the formation of new characters. (1) existing characters becoming latent; (2) latent characters become active (e.g. atavism); (3) from hybrids.

A might perhaps be illustrated by kohlrabi or species with dissected types of foliage, if a single character be allowed to be specific.

B (1) Might be illustrated by a land plant becoming aquatic, with dissected foliage and various losses of anatomical details.

B (2) Would apply to spinescent species losing their spines by developing them into branches when supplied with water.

B (3) Hybrids are not regarded as species, if known to be such.

Alluding to "atavism by bud-variation," the author refers to "one of the best instances," as he considers it, *Cephalotaxus pedunculata fastigiata*, resembling the Irish yew. The erect stem and erect branches bear leaves scattered all round on the $\frac{2}{3}$ or, perhaps, $\frac{3}{4}$ plan, according to Carrière's figures†; but horizontal shoots have the leaves also horizontal, exactly as in the common yew, the young shoots of which, if at all erect, have the leaves scattered. There is, however, no change in the insertion of the leaves, which are merely twisted on their short petioles, so that this "scattered-leaved" form really represents the primeval type, though it may be the parent form of the so-called

* *Animals and Plants under Domestication*, ii., p. 271, &c., and in several places in the 6th edition of the *Origin of Species*.

† *Production et Fixation des Variétés dans les Végétaux*, pp. 44, 45 (1865).

sport with horizontal leaves; hence he calls it "atavistic." In these cases the horizontal position of the bough induces the leaves to become horizontal too; but, as stated, only by twisting the petioles. In the case of the common laurel, *Prunus Laurocerasus*, the horizontal boughs have their leaves *distichous* while those on vertical shoots at the top of a bush are *pentastichous*, a much more important difference.

Professor de Vries draws attention to the fact that many varieties, and one may add species, are only found locally in very restricted areas and adds: "In such cases transitional forms are always lacking, a fact which proves pretty conclusively that such have not been produced in the origination of the form." But they prove inductively that the cause of their existence is the local conditions of their environment, to which they have responded. Such restriction of species is found, e.g., among the 500 or more species of *Erica* at the Cape. One I know of grows only on the rocks by a waterfall. It has lost the typical needle-like leaf and has leaves of a short oval form. Instead of being a xerophyte it has become more or less a hygrophyte.

The young and older forms of foliage of *Retinospora*, the reversion of spines to leaves in *Berberis*, &c., are referred to, on which Professor de Vries observes: "These phenomena, however, fall mostly within the sphere of systematic botany, and only concern the study of variability in so far as they are dependent on external influences." But this is the very matter the Professor should have especially studied, as ecology has proved how they are precisely the causes to be investigated, for through the action of these, varieties and species of all sorts arise.

Here again the author misses the perception of the latter being the *universal cause* of variation by response, or, to use Darwin's expressions, the "direct action of changed conditions of life," which produces "definite results," i.e., variations "without selection at all."

The author gives an interesting section on striped flowers. According to Vilmorin they only occur on those species which have a white variety, being naturally themselves whole coloured. Or, if a flower is red and yellow, the uniform yellow may behave like white in giving rise to them. The first variety to arise is the white or yellow. This is constant from the first, according to the rule, as found also by Messrs. Sutton—"Variations, *not* resulting from crossing, *usually come true from the first*, as *Primula sinensis* "Coral-pink," sporting from "Crimson King."

With regard to striping, Mr. Sutton tells me that he cannot explain the cause, "though it sometimes results from crossing a *dark* with a *lighter* variety; and the remarkable feature is that the colour is not necessarily weakened and generally diffused, but only restricted in area." An example as the result of hybridization would seem to be seen in *Petunia violacea* crossed by *P. nyctaginiiflora*; the deep violet of the former is usually striped by broad bands of white from the latter species. Professor de Vries' experience is that crossing has *only* resulted in the production of self-coloured, and not variegated

flowers. Striping appears only after the white or yellow variety has acquired complete purity, i.e., after a number of generations. The striping, therefore, exhibits a tendency to revert to the original colour.

As an example of a proliferous plant Professor de Vries experimented with *Plantago lanceolata ramosa*. He found that 50 per cent. of the offspring came more or less true, the rest reverting to the natural condition. He adds that "the number of compound ears per plant, and the degree of branching in each, are to a great extent dependent on the conditions of life. The stronger the growth of the whole plant, and the richer the foliage, the more pronounced will the anomaly be. . . The young plants almost always begin with unbranched ears; it is not until later that the monstrosity appears, gradually increasing in strength." Such appears to be the rule with *all*, even when the abnormality arises from some impoverishment, as some double flowers do; subsequently, however, high cultivation intensifies it. With regard to composites, we have a very instructive account of the origin of a true double corn marigold in the author's experiments. The wild form has 13 ray flowers, but under cultivation that number has been increased to 21 and 34. This he raised to 49, 67, and about 90, in three years successively. In all these the ligulate florets only increased in number on the circumference; then two or three such appeared in the midst of the disk florets. This was the *first* indication of the true double race which was fully developed in the next four years by selection. An interesting phyllotactical feature comes out when the number becomes high. The three, or we may say four, "cyclical" numbers, 8, 13, 21, 34, prevail. These form the well-known cycles "on the different and successive angular divergences $\frac{3}{8}$, $\frac{5}{13}$, $\frac{8}{21}$, $\frac{13}{34}$ ". The next numbers ought to be 55, 89, 144, &c. But the number of florets cannot advance quite so rapidly; for Professor de Vries found that from 1895 to 1897 it only rose from 21 to 34; then in 1898 it reached 48; in 1899, 66; and in 1900 to 101. It showed a "determination" to go on increasing, though unable to rise at once to 89 and 144. The new additions appeared irregularly among the disk florets. Another feature is that when plotted in curves the maxima *advance*. Thus in 1892 there were two (normal), viz., 21 and 34; in 1898 there were three, 26, 34, 48: 34 alone being normal; in 1899 to this were added 45, 47, and 66. Lastly, in 1900 the "tallest" maximum was 47 and another reached to 101. Some of these additional "cyclical" numbers may, perhaps, be partially accounted for as combinations of others. Thus $26 = 5 + 8 + 13$, or 2×13 ; $47 = 34 + 13$; $50 = 34 + 13 + 3$; $58 = 55 + 3$, &c. But this must be taken as hypothetical only.

Experimenting with the pelorian form of *Linaria vulgaris*, Professor de Vries tried to verify Hofmeister's assertion that the "origin of profound deviations from the normal form . . . of monstrosities" was "sharp and sudden." He cultivated the Toadflax for seven years, when "the *peloria* appeared quite suddenly in the fifth and sixth generations."

It may be observed that the spur is an "enation," growing after

the corolla has developed to some extent; and that sometimes it is wanting when the corolla becomes like that of a snapdragon. Moreover, a complete peloric flower has five spurs, but three only are not uncommon, showing that the "peloric energy" gradually affects the rest of the petals. Professor de Vries appears to have observed these facts. Since there are 130 species of *Linaria*, the "spur" must have originated very early in the history of the genus, and the power to make it has apparently become latent in every one.

With regard to the variegation of leaves, after noticing that it may be unilateral on a branch, Professor de Vries considers "the influence of external conditions on the degree of variation. On this point the literature is rich in contradictory information." As an example he mentions the variegated horseradish, which in the shade is green but in a cold frame or sunny situation is variegated. So if *Fragaria indica variegata* "is to be nicely variegated it must be planted in good dry soil, not too loamy or calcareous."

"On variegated shrubs we often see that in the better-lighted parts variegation is more intense and in the shaded ones less pronounced." He mentions variegated comfrey and *Sambucus nigra*. He omits the commonest of all, *Aucuba japonica*, the surface leaves of the bush being always much more spotted with yellow than the deeper-seated ones.

This subject would seem to fall into line with Sorby's discovery of an optimum of light desirable for every species; too much or too little will reduce the power of making chlorophyll.* The yellow colouring is therefore due to an *excess* of light; just as it is in early spring if the temperature be too low for vigorous growth of herbs. In a section on external conditions and manuring he shows, with a proliferous clover and silverweed with three or four petals instead of five, that it is immaterial whether a monstrosity consists of *more* parts or *fewer*; having once appeared, an increase of nourishment favours the anomaly; thus the clover gave 6 per cent. in a sand bed and 12 per cent. on the richer control. The *Potentilla anserina* gave 65 per cent. on the well-manured and 49 per cent. on the unmanured. Similar results occurred with *Begonia Sedeni*, &c.

Lastly, hot and dry summers produced abundance of malformations in 1866 and 1893; 1845 was a great year for peloric *Calceolarias*; 1862 for central umbels in *Auriculas*. It has often been noticed how a certain sport appears in many places in the same year. We may, therefore, conclude that external conditions—though we may not be able to trace the why and wherefore in every case—are the primary cause of all kinds of teratological phenomena. And when once they have appeared there follows an inherent tendency to repeat themselves by heredity.

There is, therefore, no necessity to assume any law of periodicity

* "Comparative Vegetable Chromatology" (*Proc. Royal Soc.* vol. xxi., p. 442, 1873).

in the appearance of anomalies or mutations; but only a change of external conditions which can introduce such influences as may be favourable for their production.

There are several other very interesting experiments one would like to refer to, as fasciation and torsion, &c., but the above will show that there is an immense amount of valuable matter in the volume.

BOOK REVIEWS.

"Flora of Jamaica," Vol. i., Orchidaceæ. By William Fawcett, B.Sc., F.L.S., and Alfred Barton Rendle, M.A., D.Sc., F.R.S., F.L.S. 8vo. 150 pp. 32 plates. (Trustees of the British Museum, 1910.) 10s. 6d.

Botanists, and all interested in orchids, will welcome this new standard work on the orchids of Jamaica, a subject previously very imperfectly dealt with, as witness the large number of new species which the authors found after comparison with the most complete material ever got together, and reference to all authorities on the subject. The genus *Lepanthes* alone gave twelve new species, while in *Nco-Urbania* and *Harrisella* the authors establish two new genera. The value of the descriptions is in many cases enhanced by the very carefully-prepared illustrations of the plants and their parts in the plates with which the work is embellished.

That the preparation of such a work has been considered many times by able men there is no doubt, but the difficulties both as regards material for comparison and other important points prevented its accomplishment. During his twenty-one years' residence as Director of the Public Gardens and Plantations of Jamaica, Mr. William Fawcett continuously studied the Flora of Jamaica, and especially the orchids. He was fortunate in getting a fine series of drawings made by Miss Helen Wood, and later in securing the collaboration of Dr. A. B. Rendle, Keeper of the Botanical Department of the British Museum (Natural History), one of the oldest botanists of our day.

Much of the work was carried on at the British Museum, and in 1904 an account of the genus *Lepanthes* was published. In 1908 when Mr. Fawcett retired and came to England, he, in conjunction with Dr. Rendle, completed the work, the permission of the Trustees having been obtained to publish it as a British Museum Catalogue, an honour which it well merits.

In the introduction the authors give the best account of the Island of Jamaica, its geological, climatic, botanical, and other aspects possible within the limits of the space at their command.

The enumeration of the orchids embraces 62 genera with a total of 194 species, full references and descriptions being given in each case together with remarks on the situations in which they are found growing naturally, which will be of use to the cultivator as well as the student. In some cases well-known species have been re-named under a new combination taking in the specific name of the original but now obsolete record, and, although in accordance with the Vienna rules, sometimes with unsatisfactory result so far as their use in gardens is concerned. An example is the *Phaius Tancarvilleae* Blume, adopted

in the present work in place of the well-known *Phaius grandifolius* Lour., which is the only recognized name for the species in gardens.

A defect is to be found in the naming of the species on the plates, the names at the foot of the plate in nine cases differing from those given on the page facing them, the differences being probably caused by the adoption of fresh combinations after the plates had been prepared. The references, however, are so ample and complete that the discrepancies are easily understood.

"Orchids for Everyone." By C. H. Curtis. La. 8vo. 234 pp. (Dent, London, 1910.) 21s. net.

This work, containing more than 150 coloured plates and nearly 50 black and white illustrations, will please most amateurs who are interested in the fascinating hobby of orchid cultivation. The text is singularly free from inaccuracies, and proves that every care has been taken to produce a work worthy of the high position which orchids now occupy in the many gardens of this and other countries.

The coloured illustrations are, on the whole, to be looked upon as an advance in photography; but we regret to say there are many which are not only untrue to nature but greatly spoil the book from a publisher's aspect. Until the art of colour photography is more fully advanced, such attempts as these should never be published.

An interesting chapter on the historical and practical part of hybridization and seed-raising, with a useful "Calendar of Reminders," should be of assistance to orchidists. Far too many pages are taken up with long lists of names which can be found in several catalogues.

"Orchids." By James O'Brien, V.M.H. 8vo., 114 pp. (Jack, Edinburgh and London, 1910.) 1s. 6d. net.

This useful book contains much that is of practical value to all amateur orchid growers. It is arranged in a series of chapters, each one dealing with an important matter, and available for reference when any question on the subject turns up in another portion of the book.

With regard to the treatment of freshly-imported plants, it is probable that more imported plants are killed through over-attention than neglect. Mr. O'Brien recommends a treatment that appears at first sight somewhat drastic, but the method has much to recommend it. Chapters dealing with the treatment of resting orchids, the uses of baskets and pots, and the methods of watering plants give much information on these important subjects.

The danger of applying manures cannot be impressed too much on the mind of the grower. Unless the subject is thoroughly understood and the practice carried out by experienced hands, failure will more probably result than success. Mr. O'Brien's statement that no orchid grower should undertake manurial experiments without first obtaining his employer's concurrence is worthy of special note.

In short articles on the methods of heating, the best kind of staging, and the various means of preventing the sun's rays from scorching the plants, advice is given in a manner which the amateur will appreciate.

There are eight excellent coloured plates, reproduced from photographs, and each represents a specimen in the collection of Lieut.-Col. Sir George Holford, K.C.V.O., at Westonbirt, one of the best of these being a very fine reproduction of *Brassocattleya Digbyano-Mossiae*, Westonbirt variety. We have nothing but praise for this exceedingly well produced work.

"Science in Modern Life." Prepared under the editorship of Professor J. R. Ainsworth Davis, M.A. 6 vols. 8vo. 188+187+187+236+208+225 pp. (Gresham Publishing Co., London, 1909-10.) 6s. net each vol.

This work might be styled a "Compendium of the Universe." Consequently the amount of matter on each subject may be said to represent only the essentials which would most interest the general reader. Special attention is given to economic uses. Vol. I. contains astronomy and geology. Vol. II. geology (continued), chemistry and physics. Vol. III. deals with physics (continued), general biology and botany. Vol. IV. botany (continued), zoology, science and the sea fisheries. Vol. V. agriculture, philosophical biology, physiology, medicine and anthropology. Vol. VI. concludes the series with engineering both on land and water. Vols. III., IV., and V. only will occupy the attention of the botanist and cultivator. In Vol. III. 37 pages are devoted to general biology, and deal with protoplasm, fertilization, the lowest forms of life and their phenomena, &c. Botany owns 23 pages, but has 84 in Vol. IV.; while 24 are given to philosophical botany in Vol. V.

In the first chapter of general biology the writer alludes to the difficulty of defining life as he observes "crystals grow." This is misleading to a beginner in science, as they do not change internally, but only increase superficially. So, too, in describing protoplasm as a "colloid," one would think of glue or glass, which are homogeneous in structure; whereas living protoplasm with its nucleus is of a highly complex organized structure. This is fully explained, however, later on. He very rightly observes that to describe the activities of life, as though known chemical and physical laws gave a complete account of them, is dangerous. These can never account for the "objects" attained by forces alone. These *must* be "directed" and life is the director. This first chapter on protoplasm is a clear, concise, and up-to-date account of its properties with its manifestations of life. Then follows a concise account of the cell and its methods of division, especially the degrees of difference between lower and higher organisms. Brief epitomes of the discoveries of the most important observers are given. This is followed by the life-histories of typical members of the lower types of the animal kingdom. Everything described is of course concise, but very interesting.

This third volume contains two chapters on botany, and deals with ecological factors and types of terrestrial vegetation, giving a brief epitome of each in an introductory chapter. The second chapter consists of types of terrestrial vegetation, with illustrations, in which the

author follows Schimper and borrows some of his pictures of scenery. Vol. IV. continues botany, and deals with various forms of temperate and polar zones; aquatic vegetation; general and applied ecology.

This will be sufficient to guide the reader to the extent and character of the work, so far as horticulture is concerned.

Two sectional models of the rose and the frog are issued with the work. The rose consists of five plates so constructed that they overlap one another. The first is the complete flowering branch, the second has the epidermis removed. The third shows assimilation, the fourth, by means of coloured lines down the stem, the movements of water and food-stuffs, and the fifth a large number of details, the interior dissections shown by lifting up little flaps over the parts. It is very well executed, but the truest pupils will not "cram" up their knowledge of the rose without dissecting it for themselves.

"The Study of Corn." By Vernon M. Shoesmith. 8vo., 96 pp., including many illustrations and figures. (Orange Judd Company, New York, 1910.) 2s. 6d.

This little handbook is intended as a practical guide for the study of *Zea Mais* as a corn-producing plant. There are many excellent illustrations, and the whole work is admirably got up. As maize is not grown as a corn crop in England it is not likely this little work will be extensively read here; it, however, shows how thoroughly our American friends study matters of great economic importance to them.

"The Standard Cyclopedia of Modern Agriculture and Rural Economy." By various authors; edited by Professor R. Patrick Wright. 8vo., vol. 9. 256 pages and many plates. (The Gresham Publishing Company, London, 1910.) 8s. net.

This volume is on the lines of the preceding eight. To be of much use the set of twelve will be necessary. The utility of the whole will depend largely on the index, and doubtless the work will be then more fully appreciated.

The present volume deals among other subjects with milk, oats, and pastures. There are many short articles in this volume, as in the others, on gardening subjects by Mr. W. Watson, of Kew, and these alone make the work of considerable interest to gardeners. We advise Fellows of the Society who have not other easy access to this work to examine it in the Lindley Library, more especially when looking up an agricultural or horticultural subject for the first time.

"The World's Commercial Products." By W. G. Freeman, B.Sc., F.L.S., Superintendent of the Colonial Economic Products of the Imperial Institute, and S. E. Chandler, D.Sc., F.L.S., Assistant Superintendent, with contributions by numerous specialists. Illustrated. 4to. Parts I.-III., 196 pp. (Pitman, London, 1910.) 6d. net each part.

The ignorance of many otherwise well-informed persons regarding the origin of numerous articles of every-day use or consumption and of

the raw materials employed by the manufacturer is often astonishing. This is probably due to the lack of books on the subject that are at once reliable and not too technical. The serial publication under notice, which is to be issued in twelve parts, is intended to supply the demand for a work dealing with economic plants and their products, which enter the international markets of the world. Part I. is concerned with the principal cereal crops, *i.e.*, wheat, barley, rye, oats, and rice. The importance of this group of plants may be gathered from the fact that the annual value of wheat alone imported into the United Kingdom reaches the enormous total of £35,000,000. Some account of the history and the different forms of wheat is given in the chapter devoted to this subject, together with the methods of cultivation in different countries. Such primitive methods as sowing broadcast and reaping with sickle or scythe are described and compared with the expeditious methods adopted in the Far West, where the latest mechanical appliances that the wit of man can devise are employed to reduce the amount of human labour required to raise the crop. Barley, oats, and rye are also important cereals, but in this respect do not compare with rice, which, in Eastern countries, holds a place even more important than that of wheat in Western lands, being, in fact, the staple food of about one-half the whole population of the earth. The descriptions and illustrations of the cultivation and preparation of rice are not so familiar to western readers as are those dealing with the other cereals mentioned. Machinery is employed in but few countries where it is grown, with the exception of the Southern States of North America, and most of the methods adopted are of the most primitive character. The numerous illustrations, which are reproductions of photographs, add considerably to the value of the work, as do also the outline maps indicating the principal producing areas. To the general reader as well as to those engaged in tutorial work this book promises to be of great interest and value.

Part II. continues the article on rice and contains an account of maize and the various cereals and forage grasses known as millets. Many of the seeds of the last-named groups of plants are familiar as bird seeds in this country, but their importance in the East as a food for human consumption is by no means fully appreciated. Maize or Indian corn is a very important cereal, the two principal countries concerned in cultivating it as an export crop being the United States and Argentina. In the last-named country it is estimated that some 5,000,000 acres are under maize cultivation. Everyone is familiar with the maize grain, but maize-oil obtained from the germ is seldom met with in this country, although in the United States it serves as a table-oil and is also used in soap-making. The maize-leaf cigarette wrappers which are frequently seen in London shops are prepared from the inner leaves which enwrap the maize cobs.

Part III. contains an account of starch- and sugar-yielding plants. Starches derived from the potato, *Manihot* roots (Cassava and tapioca),

rice, wheat, maize, arrowroot, and sago are dealt with in an interesting manner. The preparation of these important food-stuffs is described and fully illustrated. Some idea of the importance of sugar in the world's commerce may be formed when it is realized that the value of the annual sugar crop is something like £180,000,000, and this by no means includes the value of the whole crop, as large quantities are consumed locally in the countries of production and do not come into the world's markets. While beet and cane are the principal plants that supply the bulk of the commercial sugar, numerous other plants are mentioned that supply this product for local needs, and some may possibly be the sugar-yielding plants of the future. Now that the cultivation of sugar-beet in this country is being so much discussed, this article will appeal to many who are interested in the subject.

“Alpine Flowers and Rock Gardens, Illustrated in Colour.” Described by Walter P. Wright. With notes on Alpine Plants at Home by William Graveson. 8vo. 292 pp. (Headley, London, 1910). 12s. 6d. net.

This fresh volume on the cultivation of alpine plants although diffuse is written with authority, and the various lists of alpine plants suitable for growth in amateurs' gardens are thoroughly practical. We think, however, that in a few cases a little more care might have been exercised. For instance, *Omphalodes verna*, if placed in congenial surroundings, will kill every other plant for yards around it, while *Omphalodes Luciliae* is one of the most difficult plants that the alpine culturist has to deal with, as in addition to its own fastidiousness it has to be protected against the attacks of slugs, which are inordinately fond of it. The great feature of the book is the coloured illustrations, which give a good idea of the way the plants grow in their natural habitats. If the volume had been compressed it would be more valuable than it is.

“Plant Life in Alpine Switzerland.” By E. A. Newell Arber. 8vo., 355 pp. (Murray, London, 1910.) 7s. 6d. net.

This book is written by a scientific man upon the characteristics of alpine plants as seen in the regions in which they grow. To the really enthusiastic cultivator of alpinism it will be of considerable value, as it shows the way in which the various species have adapted themselves to their surroundings, and it should aid him to build his rockery so as to suit the requirements of the various plants both as to soil and position. It distinguishes between plants which are truly high alpinism and those which although growing in alpine regions are also to be found in the lowlands where their characteristics are different.

“Elementary Botany.” By J. W. Oliver. New edition revised by W. B. Grove, M.A. Sm. 8vo., 216 pp. (Blackie, London, 1908.) 2s.

Many students have found this little book of great assistance, and its revised version does not fall behind in any point. Though it deals

rather with botanical dry-bones, it will serve as a skeleton which the intelligent student with a sympathetic teacher will be able to clothe out of Nature's storehouse and round into a fair and pleasant figure.

"Simple Lessons in Nature Study." By J. O'Neil. 8vo., x. + 122 pp. (Blackie, London, 1911.) 1s. net.

We are not quite sure of the author's name, which is spelt O'Neill on the title-page and O'Neil in two places on the cover. The book is a sort of elementary plant-life and animal-life book. A quotation will show better than anything else what may be expected in it. "Carbonic acid gas is taken into the interior [of the leaf], the light from the sun falls on the gas, and with the help of the chlorophyll granules, effects a separation between the oxygen and the carbon; the union between these no longer exists, and most of the oxygen goes back again into the air, leaving the carbon in the leaf. The heat of the sun acting on the water in the porous leaf dissolves the partnership between the hydrogen and oxygen, and, as before, one of the partners—oxygen—vanishes into the atmosphere, leaving the hydrogen behind in the leaf. These interesting processes could not, it is believed, be carried on without the active assistance of the green colouring material" (pp. 32 and 33). We need not multiply instances of loose statements as we might easily do, but it is surely not too much to expect in these days of so many excellent books, that those intended for teachers' use, even though they are elementary, should contain something better than this kind of thing. There are copious illustrations, most of which are familiar. The figure on p. 22 is labelled sweet pea, but it is unlike any in nature.

"Evolution, Darwinian and Spencerian." By Raphael Meldola, F.R.S. 8vo. 44 pp. (Clarendon Press, Oxford, 1910.) 1s. 6d. net, paper covers.

The Herbert Spencer Lecture in the University of Oxford for 1910 is here printed. The lecturer, eminent both as a chemist and as an entomologist, compares the evolution theories of Darwin and Spencer, and puts the case for inductive and deductive reasoning so well that all interested in that greater science that should embrace all science should read his remarks.

"The Feeding of Crops and Stock." By A. D. Hall, M.A., F.R.S. 8vo., xvi. + 298 pp. (Murray, London, 1911.) 5s. net.

Like Mr. Hall's former books this is eminently readable and eminently reliable. He has written an account of the way in which plants and animals of the farm obtain and utilize the materials upon which they feed, and in the writing has everywhere appealed to experiment and shown the limitations of our present knowledge. He has found it necessary here and there to traverse again ground covered in his well-known book on the "Soil," but with a freshness and clearness that prevent his words from appearing mere repetitions.

A considerable number of experiments with plants are well and clearly illustrated and described, as a rule, sufficiently to enable anyone to perform them. It might have been mentioned, however, with regard to the experiment (fig. 3) on p. 22, that a *water* plant should be used, and it would probably be better to omit the well-known demonstration of the effect of light in assimilation by means of a stencil (p. 27 and fig. 5.) The material used for preventing the incidence of light prevents also the access of air, and a transparent glass stencil will produce precisely similar results. Some of the stomata in the diagram on fig. 10 (p. 38) appear rather unnatural. These little points, however, and a few others like them, where the author has merely followed one or two popular approximations to truth, detract nothing from the general excellence of the book, which lucidly and interestingly details the main facts in the nutrition of plants and animals, and we can heartily commend it to the practical man and to the student, who will find here a sound basis for future work.

The book is singularly free from misprints (though, perhaps, "troubled" on p. 24, should be "turbid"), and the illustrations are excellent.

"The Natural History of Coal." By E. A. Newell Arber, M.A., F.L.S. 8vo., x. + 163 pp. (University Press, Cambridge, 1911.) 1s. net.

The author deals in a most interesting fashion with the nature, origin, and mode of formation of the various types of coal, lignite, &c.

"The Liverworts, British and Foreign." By Sir Edward Fry, G.C.B., and Agnes Fry. 8vo., viii. + 74 pp. (Witherby, London, 1911.) 2s. 6d. net.

Those familiar with the little book by the same authors on "Mosses" will expect to find in this an interesting and reliable account of their near relatives, and they will not be disappointed. Anyone who takes an interest in the lower types of vegetation in the wood or garden beyond regarding them as a nuisance when they occur on his pots of seedlings, will find an excellent account of the history and structure of these moss-allies in this little book.

"The Modern Culture of Sweet Peas." By Thomas Stevenson. 8vo. 86 pp. (The Cable Printing Co., London, 1910.) 3s. net.

Of the making of sweet pea books there seems no end. This one of Mr. Stevenson's, however, is one of the most practical that has come into our hands. He treats in a thorough fashion the questions of soil and situation, time of sowing and planting out, staking, mulching, feeding and watering; varieties for exhibition, for garden decoration, for market and for indoor decoration. There are also chapters on early flowering in pots, and the decorative value of sweet peas. Six very well-executed coloured plates are given, besides several half-tone blocks. The latter are most valuable, as they convey an excellent idea of Mr.

Stevenson's methods, and in one, where the author is depicted cutting flowers from a magnificent row of "Mrs. Hugh Dickson," the splendid results obtained are vividly presented. Would that all writers on sweet peas were as conscientious in their work as Mr. Stevenson. On page 7, he says, "Were I not a member of the Floral Committee of the National Sweet Pea Society, I would not grow more than one-third of the varieties I grow now, but I feel, to speak authoritatively, one must not only see growing, but actually grow, many of the varieties for comparison, and watch them under varying conditions, as it is only this constant observation that gives one a true idea of the merits of individual varieties." The writer declares as his opinion after much observation and study that for both light and heavy soils autumn-sown plants, sown and wintered in pots and planted out in spring, are best for providing good flowers over a long period, and for resisting all kinds of blight and disease. In the directions for spring sowing out of doors, Mr. Stevenson recommends the seeds be sown two or three inches deep! We fancy this can only be advisable on light soils, and seldom even in them. It is a pleasure to commend this book, and we hope the publishers will soon see their way to bring out a popular edition of it at one shilling.

"Carnations, Picotees and Pinks." By T. W. Sanders, F.L.S. 8vo. 188 pp. (Collingridge, London, 1910.) 2s. 6d. net.

There are now many books published on the carnation, all of them containing good practical information. The present volume by Mr. Sanders treats shortly of the history and classification of the genus. The classification and history have been published again and again in books and papers; and in the present instance, it is stated that "the present race of yellow-ground picotees is really due to the efforts of the late Mr. Martin R. Smith." Mr. Smith raised many very beautiful varieties; but he had excellent material to work with when he took up the yellow-ground picotee. Many first-class varieties were in cultivation and were being exhibited in London and elsewhere annually before Mr. Smith began to cultivate the carnation. This much in justice to other raisers. Remarks on propagation and culture are very good, and may safely be followed. It is stated that seedlings should be planted out in June, which is right, but as they are to be planted out in a specially prepared bed, a foot apart is too close. They ought to be sixteen to eighteen inches apart. The illustration of layering at page 18 is surely unusual; where much of it has to be done there would not be time to use two pegs to each layer, one of them tied to the layer. The cultivation in borders and flower pots is carefully and minutely described. Mr. A. J. Rowberry, an amateur, who exhibited carnations some years ago, has a chapter on cultivation for exhibition; and to make the work complete instructions for exhibiting the flowers in vases and also on cards are fully explained. There is a calendar of operations, and remarks on cultivation in window boxes. Part II. treats of perpetual flowering carnations and the Malmaison; and these have been very

fully dealt with both as regards propagation and after treatment. The history and cultivation of the garden pink is contained in Part III.

The lists of variety carnations are, perhaps, too much extended. The object seems to have been to give a list of every variety known. There are 460 varieties of selfs and fancies, besides numerous other lists for special purposes made by the leading growers of these flowers. Messrs. Jas. Douglas, Wm. Sydenham, and A. F. Dutton give useful lists of selected varieties.

The chapter on insect and other pests is a very useful part of the work. The illustrations are excellent, except the one at page 90; it is labelled border pink 'Albino.' It is certainly not 'Albino,' which has smooth well-formed petals of the florists' type. It seems to be 'Mrs. Sinkins' labelled 'Albino' in error.

"Home-bottled Fruits and How to do Them." By G. W. S. Brewer. Ed. 2. 8vo. 40 pp. (The Author, Nailsworth, Glos., 1909.) 1s.

This little book gives very clear directions concerning the bottling of all the common fruits of our country. The author advocates as a rule the bottling of fruits in syrup instead of water.

"The Manuring of Market Garden Crops." By Bernard Dyer, D.Sc., and F. W. E. Shrivell. New edition. 8vo. 144 pp. (Vinton, London, 1910.) 1s.

The results obtained by manuring vegetable crops with artificial manures, especially with nitrate of soda instead of, or in combination with, farmyard manure, formed the subject of a lengthy communication from the present authors to our JOURNAL. This little volume contains an account of the same series of experiments embracing the results obtained up to 1910, and should prove of value to all who desire reliable information upon the manuring of kitchen garden crops.

"The Students' Introductory Handbook of Systematic Botany." By J. W. Oliver. 5th edition. 8vo. 372 pp. (Blackie, London, n.d.) 4s. 6d.

A reprint of the fourth edition of this well-known book.

"British Ferns and Their Varieties." By C. T. Druery, F.L.S., V.M.H. 8vo., xii. + 459 pp. (Routledge, London [1911].) 7s. 6d. net.

A feature of this excellent account of the varieties of British ferns, an account which no one is better qualified to write than the author, is the numerous illustrations: excellent line drawings, a few half-tone plates, and many coloured ones. The last are for the most part representative of fronds in the collection of the late Colonel A. M. Jones, of Clifton, and it is just possible that the purpose of the book might have been better served if a little more selective discretion had been exercised, and some others, illustrating beautiful forms from other collections, added. The book is one which will, we feel sure,

do much to stimulate interest in the forms of our native ferns, and awaken some to a knowledge of what can be done towards a study of variation within the comparatively narrow bounds of a country like our own. Fern varieties have long had many devotees but none more enthusiastic than the author, and none more eager to make converts.

"The Study of Plant Life." By M. C. Stopes, D.Sc. Ed. 2. 8vo., x. + 202 pp. (Blackie, London, 1910.) 3s. 6d.

Another elementary botany book, but a good one. The authoress starts with a simple series of experiments on the principal activities of plants, deals with the main morphological characters of British plants, and then proceeds to study special groups and to map areas. The whole forms an admirable introduction to elementary botany, but in another edition one or two of the experiments suggested might well be revised, after subjecting them to that scientific scrutiny that is desirable, even when "simple" experiments are in question.

"Open-air Studies in Botany, or Sketches of British Wild-flowers in their Homes." By R. L. Praeger. Illustrated by drawings from Nature by S. Rosamond Praeger, and photographs from Nature by R. Welch. Ed. 2. 266 pp. (Griffin, London, 1910.) 6s. net.

This is a charming book, and just what is needed for a young enthusiast who begins to understand what "Ecology" or the "Study of Plants at Home" really means, and not only botany in the old sense of knowing the names and classification of plants. We are taken over A daisy-starred pasture; By the river; A Connemara bog (which, however, is not British, but we can well excuse it); Where the samphire grows; Among the corn; In the home of the Alpines, &c. There is much more than an enumeration of the plants to be found in these localities, for details about their life histories are given, including such interesting matters as fertilization, insectivorous features, geographical distribution, &c. To the beginner the study of botany on the old lines is always necessary, and he will find in this book very many names, so that he should be accompanied with a "flora," such as "John's Flowers of the Field," in order to see where their place is in classification. The two together will render botany far more enjoyable than merely collecting plants and recording their names.

"The Oak: Its Natural History, Antiquity and Folk-lore." By Charles Mosley. 8vo. 126 pp. (Elliot Stock, London, 1910.) 5s. net.

This is a thoroughly readable little book, one of those to the perusal of which we can in a spare moment return with a more than ordinary amount of pleasure. The natural history, antiquity, and folk-lore of the "Monarch of the forest" have never before appeared in book form, and the author is to be congratulated on having done his work well and given us in a little over one hundred pages everything that is worth

knowing regarding this, the noblest of our forest trees. Particularly interesting to the general reader are the chapters on the folk-lore and Biblical references to the oak, while even those who are interested in the tree from a purely financial point of view will find much of value in the chapter which deals with the "economic value of the oak." The number of mistletoe oaks might have been increased, while the account of the ravages of insect and fungoid pests is hardly as complete as could have been desired. We can confidently recommend the book, which is pleasantly written and nicely illustrated, and hope that Mr. Mosley will extend his researches in a similar way to other of our forest trees.

"British Roses." (1) *The British Roses* (excluding *Eucaninae*). (London, 1910.) 140 pp. 3s. (2) *The Subsection Eucaninae of the genus Rosa*. By Major A. H. Wolley Dod. 110 pp. (London, 1908.) 2s. 6d.

In the year 1894 Professor Crépín published in the *Journal of the Royal Botanic Society of Belgium* "An Essay on the Necessity of a New Monograph on the Roses of England." Necessity, though "the argument of tyrants," is a summons we know that "Nature must obey," and in due time our author has appeared to provide us with the monograph desired by the Belgian Professor.

In 1908 and 1910 Major Wolley Dod published a series of papers in "*The Journal of Botany*" which are now collected and to be obtained separately as the two little books before us, which make together a compact volume of some 250 pages. The task he set himself has been to collate descriptions, and bring our knowledge of the genus *Rosa* more on a level with that of continental Rhodologists. He has, however, by no means confined himself to this useful, if somewhat humble task, but has made a careful and critical study of the Herbaria at Kew, at South Kensington (which contains the collection of Déséglise), and at the Linnean Society, and appears, with the assistance of Miss Willmott, to be making "as complete a collection as possible of growing specimens of British forms" in that lady's garden at Great Warley. The information thus acquired has enabled him to bring so much knowledge to bear on his task as to give us original work of no inconsiderable value.

After a brief description of the principal characteristics which have been relied on for differentiation, and a glance at the methods adopted respectively by Crépín, Déséglise, Rouy, and Keller, Major Wolley Dod plunges at once into an account of the British species and varieties, which, save for about ten pages of "Recapitulation" and the Index, occupies the rest of the volume. The author has made free use of the descriptions both of Baker and of Déséglise, and at the end of each section he usually gives some notes on the foreign species of the group.

In 1869 Baker had described in his monograph (*Jour. Linn. Soc.*, vol. 11, pp. 197-243) some seventy species and varieties of British roses. Major Wolley Dod has nearly doubled their number, describing

in detail 137 species and varieties, besides indicating a few synonyms and unnamed forms. When it is considered that these are all critically and carefully described, this alone is sufficient to show how great is the amount of work Major Wolley Dod has expended on his subject.

But much remains to be done. He tells us, and it is obvious, that he has left the work of classification to a later period. It is perhaps somewhat to be regretted that in the circumstances he has not adopted Baker's method, which has become familiar to students of the British species. The arrangement he has selected is based on that of Keller.

It is possible to say this and yet to admit that many of his rearrangements are fully justified. For instance, it is now generally accepted that the *Involuta* and *Hibernica* groups ought properly to be regarded as hybrids of *spinosissima*, the first with *villosa* and the second with *canina* (or, as Crépin thought, with *glauca* or *coriifolia*), but it is probable that when the problem of classification is taken up in earnest this process will have to be carried much further.

The classification of *Rosa* is at once a most difficult and most interesting study. Its difficulty, apart from the number of varieties to be dealt with, arises from two distinct qualities of the rose. One is that the powers of hybridization of species and varieties are so immense that we seem to find all possible intermediate forms between any two or more types, while the hybrid forms do not possess the quality of sterility by which they may often be recognized to anything like the same degree that usually obtains in other genera, and the second is the considerable variation that may take place in the same varieties in different situations by the process of adaptation to environment.

But the interest of the subject is hardly less than its difficulty, for the solution involves some progress in unfolding of the laws of evolution. How and on what principle are we to define the limits of apparently overlapping species, and how to determine the relative importance of varieties? No doubt Major Wolley Dod is right in saying that an entirely new list of County records will be required. A far more accurate and extended knowledge of the relative distribution of varieties, and the external conditions of soil, climate, and situation under which they are found growing, seems of the first importance in formulating a scientific classification.

Crépin had suggested that it would be found that the ordinary form of *canina* was replaced in the north and the mountainous districts by *R. glauca* and *coriifolia*; this is confirmed by our author, who adds to these the *villosa* group. Now the hairy character of the *villosa* group is a protection against both cold and wet, and from this and their sturdy habit it is easy to understand the prevalence of the *Villosas* in these districts. Again, forms of the *villosa* group are often difficult to distinguish from *glauca* and its congeners, so in this direction we may perhaps find an explanation of Professor Crépin's observation.

Further, we want more careful examination of the floral organs. Malformation or want of virility in the pollen grains and imperfect

development of the ovules may lead us to suspect a hybrid origin, and there is much work for the hybridist in the endeavour to obtain existing forms by hybridization of known varieties.

Major Wolley Dod fears it will be felt he has done "nothing original and has left the genus in confusion." We cannot agree. His work is so thorough and his criticism so good that it cannot help affording the greatest assistance to future workers, and if, as we agree, there are large fields left to conquer, we look forward to a revised edition later on, when he will take up the questions he has perforce left unsettled.

It would be a great help to students if the new edition, when it comes, could be accompanied by a few photographs and diagrams illustrating the differences of habit, serratures of the leaves, and other important and typical organs of the British roses.

"Methods of Plant Histology." By C. J. Chamberlain, A.M., Ph.D. Ed. 2. 8vo. x. + 262 pp. (University Press, Chicago, 1905.) 9s. net.

This little book is a fit companion for the serious student of botanical histology. It deals with the necessary apparatus, reagents for killing and fixing, and for staining. Staining methods are fully described, and the action of differential stains is dealt with. The making of temporary mounts and of microchemical tests occupies a chapter. Then follows a full description of methods of section-cutting, embedding, and section-mounting.

Following the chapters on general technique special types are chosen, and the best methods of studying them are described.

We can confidently recommend this book as a very handy laboratory companion.

"Flowers of the Field." By the Rev. C. A. Johns, B.A., F.L.S. Edited by Professor G. S. Boulger, F.L.S. Ed. 33, 8vo. l. + 611 pp. (S.P.C.K., London, 1911.) 7s. 6d.

When a book has attained to the dignity of a thirty-third edition, and has been before the public for fifty-eight years, little need be said in its favour. Not a few who now take more than a dilettante interest in the British flora, and among them the editor of the present edition, and the writer of this notice, gained their first acquaintance with the "flowers of the field" under the guidance of this book, and as years have passed its value has been enhanced by revision and additions and so on, so that it has more than held its own among its numerous competitors. The present edition is a still further improvement upon its predecessors, and the editor has taken the opportunity of revising the nomenclature in view of the Vienna Laws, and one may express the hope and belief that except in a few instances the names here given represent something much nearer finality than is the case in any other popular book. It is a complete flora, too, and includes the latest discoveries among British plants, such as *Luzula pallescens*, &c. This edition, like the last, has a number of excellent coloured illustrations.

"Popular Garden Flowers." By Walter P. Wright. 8vo. 376 pp. (Grant Richards, London, 1911.) 6s. net.

In our opinion this is one of the best books written by this popular writer, and we are glad to see he protests against the overcrowding of plants. He says, "Many amateurs grow too many kinds of plants. They crowd their beds, borders, and rockeries with a heterogeneous assembly of genera, many of which are of no special value. They would find gardening equally interesting, and far more effective, if they selected a few of the great flowers, which have been developed by florists, studied the habit and requirements of the plants, and made themselves acquainted with the best varieties." The author has admirably indicated what he means by this, in dealing with the great and popular flowers, such as Anemones, Asters, Campanulas, Carnations, Aquilegias, Dahlias, Chrysanthemums, Roses, Iris, Paenies, and so on, that one usually associates with an old garden, where one expects to find old-fashioned and beautiful flowers in profusion.

There are good illustrations in colour of Lilies, Sweet Peas, Hollyhocks, Larkspurs, and Roses, and some capital black-and-white illustrations. The printing is excellent, and the book well-turned out, finishing with a first-rate index.

"A Book of Gardens." Illustrated by Margaret H. Waterfield. 8vo. 131 pp. (Foulis, Edinburgh, 1910.) 2s. 6d. net.

This book is a description of the gardens of famous authors; no mention is made of any author, therefore we imagine it is compiled from various sources. The illustrations are done in Miss Waterfield's usual beautiful colours, and the decorations are by A. W. Graham Brown. All the chapters on the various authors' gardens are interesting, but Cowper's Garden (from his letters) are particularly interesting, all his letters being delightful reading, and for these letters alone the book is well worth the price charged. The book is well printed, and though there is no index the contents are clearly set forth in the commencement of the book.

"A Book about the Garden and the Gardener." By Dean Hole. 8vo. 372. (Nelson, London, 1910.) 1s. net.

In all the mass of garden literature of the present day there is no writer or author so gifted, or so fascinating as Dean Hole. The racy style, great fund of anecdotes, all leading up to, or emphasizing some point, were all so charming, that when the Dean wrote a book, or articles in the Horticultural Press, the writer well remembers how eagerly lovers of gardening devoured what he had written. Most of the matter was written as long ago as 1892, and we feel sure that anyone reading this book now will derive much enjoyment and profit from its pages. "The Gardener's Dream," "The Six of Spades," "The Joy of a Garden," and other chapters appeared, we believe, years ago, and during the Dean's lifetime, in periodicals. And it is a boon

to get them all together in a handy book form at such a low price as one shilling, and we advise all who have not read the book to get it, and reap ample enjoyment for the outlay.

“The Beginner’s Book of Gardening.” By Harry Roberts. 8vo. 88 pp. (Lane, London, 1910.) 2s. 6d. net.

This is another of the series of useful books, written by Mr. Roberts. It is thoroughly practical, and one that can be highly recommended for its general excellence. It is nicely printed, well illustrated, and provided with a good index.

“Salads and their Cultivation.” Edited by T. W. Sanders, F.L.S. 8vo. 109 pp. (Collingridge, London, 1910.) 1s. net.

Mr. Sanders is so well known as a thoroughly sound and practical writer, that we need scarcely state that this work is excellent, and ably deals with a neglected, but very important subject. There is no question that we do not grow sufficient variety or kinds of salads, all of which are quite easy to cultivate, and most enjoyable for the salad bowl, and if gardeners, amateur and professional, will read this book carefully, they will be astonished what a great variety of things they could have, and what a number of recipes there are for making them enjoyable. Practically all salad plants are included; the best modes of cultivation are given; their diseases and pests are described, and everything is easily found by means of a capital index.

“The Sweet Pea Annual, 1911.” Edited by C. H. Curtis and H. J. Wright. 8vo. 132 pp. (C. H. Curtis, Adelaide Road, Brentford, 1911.) 2s. net.

This annual is an improvement on the previous issues, and the joint editors deserve congratulations on the completeness and excellence of their work. There is a capital frontispiece of the president of the Sweet Pea Society for 1911, Lady Northcliffe, followed by the names of the officers and committees, then articles by Mr. S. B. Dick on Sweet Peas in British Columbia, one by Mr. C. Harmon Payne on the Bibliography of the Sweet Pea, and other very interesting matter. A valuable chapter dealing with the “Investigation of Sweet Pea Diseases” is found in the middle of the book, and lists of the best varieties to grow, &c., all of great value to the Sweet Pea grower.

BOOKS AND PAMPHLETS PRESENTED, PURCHASED, OR REVIEWED
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- 1 = Sent for Review.
2 = Purchased.
3 = Presented by the High Commissioner for Canada.
4 = " " Dr. M. C. Cooke, M.A., V.M.H.
5 = " " Donald Macdonald, Esq., F.L.S.
6 = " " G. B. Francis, Esq.
7 = " " the Author.
8 = " " Venble. Archdeacon Donne.
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10 = " " Miss and Messrs. H. and W. Goswell.
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13 = " " the Director, Royal Gardens, Kew.
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15 = " " the Director, Missouri Botanical Garden.
16 = " " John Rennie, Esq.
17 = " " Henry Wyndham, Esq.
18 = " " Harry J. Veitch, F.L.S., V.M.H.
- AGAR, MADELINE. *A Primer of School Gardening*. London, 1910. 8vo. (1)
ALBEE, HELEN R. *Hardy Plants for Cottage Gardens*. New York, 1910. 8vo. (1)
ARMSTRONG, HENRY E. *The Teaching of Scientific Method and other Papers on Education*. Ed. 2. London, 1910. 8vo. (1)
BAILEY, L. H. *The Outlook to Nature*. New York and London, 1905. 8vo. (1)
— *The Nature-Study Idea*. Ed. 3. New York, 1909. 8vo. (1)
— *Manual of Gardening*. New York, 1910. 8vo. (1)
BATES, H. W. *The Naturalist on the River Amazons*. London, 1910. 8vo. (1)
BLANCHAN, NELTJE. *The American Flower Garden*. London, 1909. 4to. (1)
BOURCART, E. *Les maladies des plantes*. Paris, 1910. 8vo. (2)
CASTLE, R. F. *Tomatoes: and How to grow Them*. Ed. by T. W. SANDERS. London, 1910. 8vo. (1)
CAVERS, F. *The Senior Botany*. London, 1910. 8vo. (1)
CECIL, HON. MRS. EVELYN. *A History of Gardening in England*. Ed. 3. London, 1910. 8vo. (1)
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DIPLOMA FOR HOLDERS OF THE VICTORIA MEDAL OF
HONOUR.

Holders of the Victoria Medal of Honour having expressed their wish to possess a Diploma which they could frame and hang in their studies, the original Diploma, sent out with the first issue of the

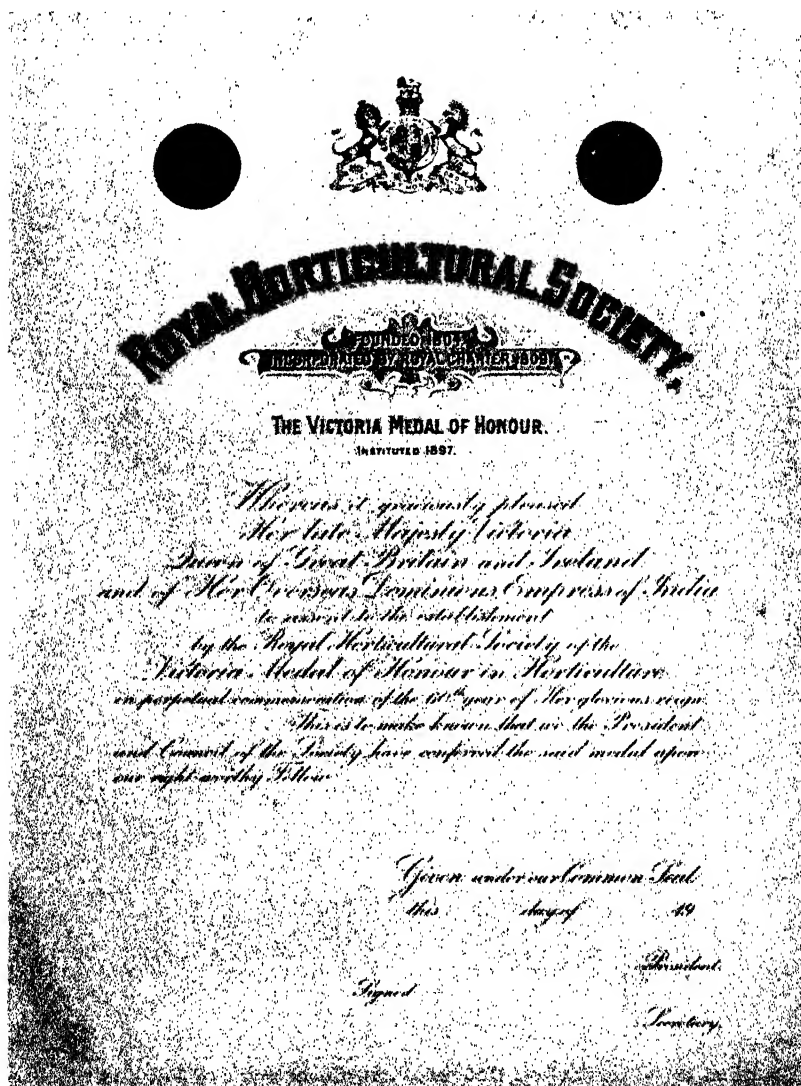


FIG. 67.—DIPLOMA FOR HOLDERS OF THE VICTORIA MEDAL OF HONOUR.

medals, has been revised. The heading and text is printed in red, and the medallions in the corners, representing the obverse and reverse of the medal, are in gold. (Fig. 67.)

DIPLOMA FOR HONORARY AND CORRESPONDING FELLOWS.

The President and Council have recently considered the advisability of issuing a Diploma to the Honorary Fellows and Corresponding

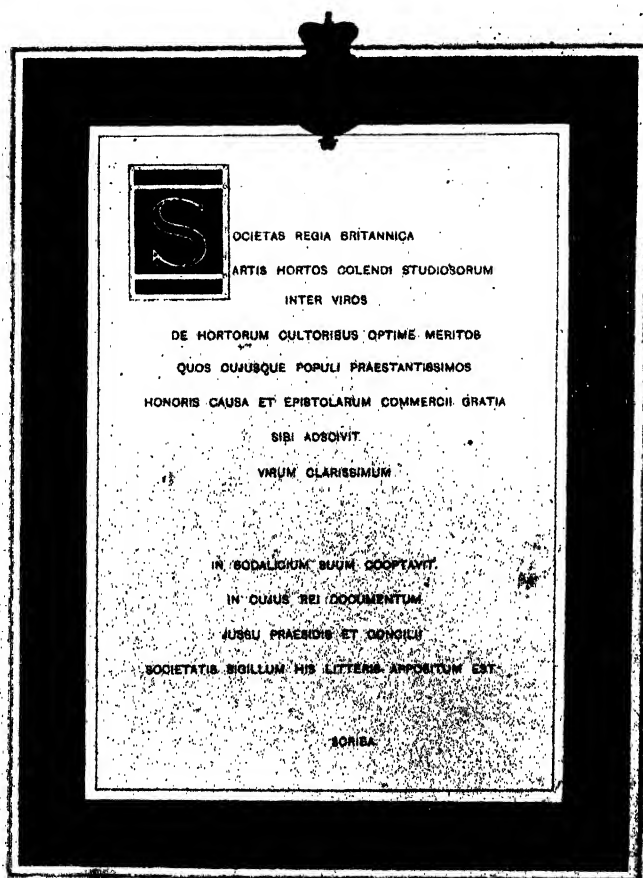


FIG. 68.—DIPLOMA FOR HONORARY AND CORRESPONDING FELLOWS.

Fellows of the Society indicating a distinction which had been conferred upon them in the world of Horticulture. A suitable design was therefore prepared, and in the month of May the Diplomas were issued.

A reduced copy of the Diploma is illustrated at figure 68. The Latin text may be freely translated thus :—

“The Royal Horticultural Society of the British Empire has elected to its Fellowship amongst the most eminent horticulturists of every country whom it has admitted to the rank of Honorary and Corresponding members the illustrious——.

In proof of which, by order of the President and Council the Seal of the Society has been affixed hereto :—

Secretary.

EXAMINATIONS IN HORTICULTURE, 1911.

I. EXAMINATION OF EMPLOYEES IN PUBLIC PARKS.

JANUARY 16, 1911.

THE Royal Horticultural Society's Sixth Examination of Employees in Public Parks was held on January 16, 1911.

As previously, the examination was partly *viva voce* and partly written, occupying three hours and twenty minutes. It was held at the Society's Hall in Vincent Square, Westminster.

Sixty-eight candidates entered, and of these 16 secured places in the first class, 31 in the second, and 15 in the third, leaving 5 candidates who failed to satisfy the minimum requirements of the examiners and one who was absent. The majority of the London Parks employees have now obtained passes in this examination, hence the smaller number of the entrances this year.

It is hoped to organize another examination in 1912 not only in Westminster, but in some of the most central towns of the Provinces, and the Secretary of the Society would be glad to hear as early as possible from those Public Authorities who would like their gardeners to sit for it.

The written papers show this year a greater familiarity with trees and shrubs than formerly. The more general use of the botanical names and terms was most gratifying, indicating as true what has for so long been contended, viz. that it is equally easy to learn and remember the botanical name if its origin and meaning is understood.

Question 3 revealed a very great lack of knowledge of the more recently improved varieties of Lilac, Spiraea, Deutzia, and Philadelphus, and coupling this fact with the frequent excuse of candidates that, being stationed in one park only, they have no facility for extending their knowledge, public park gardeners are urged to take every possible opportunity of visiting other public and *private* gardens, and of studying closely the weekly gardening periodicals. It may even be possible—and it is certainly very desirable—for the Local Authorities to cause men, who are anxious to extend their knowledge and experience, to work for definite terms of, say, three months in different gardens, according to an arranged cycle. The stimulus of the sight of the new plants and shrubs, and conditions of environment of the varied gardens, added to the encouragement such a procedure would give, must have highly beneficial results.

The questions on manures were fairly well answered, but their nature, and the principles underlying the use of each, are insufficiently understood. Something more definite than the mere mention of a

name is wanted. The different characteristics of different manures; their particular and specific uses; their origin and composition; the most practical methods and best times of applying them to the soil, and their relative cost, should be familiarized.

Question 12 was set to test candidates' powers of observation, and to enable them to describe the habits of tree life that come under their notice every day; but the answers were disappointing—even the term "habit of growth" being, in some cases, either not known or not understood. Gardeners must learn the art of seeing, that is of observing, if they would be something more than mere rule-of-thumb tillers of the ground. Again, some candidates confused evergreens, firs, and pines with deciduous trees when they were asked to illustrate the latter by common examples.

Most of the examples in freehand drawing of sketches of flower-beds were very poor in execution, and greatly lacking in fertility of thought and ideas. The need for the sense of design has been frequently urged in the reports of previous examinations.

The arithmetic in Questions 13 and 14 was simply deplorable; indeed, in the latter, no two answers agreed!

Candidates are strongly recommended to take the list of questions set on January 16, and work them out at home with the aid of their text-books, committing well to memory facts unknown to them. The object of the examiners, remember, is not to find fault, but to help the candidates to discover their own deficiencies and to suggest how they may best supply them.

In the viva voce questions the candidates on the whole acquitted themselves very well. The questions asked are entirely confined to those matters of which a knowledge is absolutely indispensable to the successful working and management of public parks and town gardens. They are mostly of a simple and practical character, so that any observant worker with a few years' experience behind him should have no difficulty in answering them quite satisfactorily. The candidates were particularly weak on the point of identifying trees and shrubs from specimen twigs—although each specimen represented widely divergent "habits of growth," and quite distinctive features assisting recognition.

So many gardeners having now successfully passed this Parks Examination, the Secretary of the Royal Horticultural Society recommends to them the higher "General Examination," which is held annually in spring. Do any gardeners regret their successes in the Parks Employees Examination? Has not the result to themselves, mentally, intellectually, and practically, proved fully, and more than fully, "worth the while"? worth the time and effort devoted to secure a pass—not so much as a step to promotion in wages, but rather for the pleasure and happiness resulting from a better understanding of the subjects of their daily care.

Surely the answer cannot be anything but "Yes"; and, therefore, they are asked not to be contented with the progress which they have

thus far achieved, but to press on to higher ability and honours, and to that greater knowledge which success in the "General Examination" implies.

At the same time it is hoped that candidates low in the list will not be disheartened, but encouraged, by the greater success of their fellows, to work on to higher places next year. With so encouraging a report as only five actual failures there is every hope for those who have won only a third class to work up to the second, and the seconds up to the first class. And with patient endeavour and careful observation, coupled with intelligent inquiry into the reasons and causes for what is done and observed during the coming season, much progress should be made and useful knowledge stored up in readiness not only for the next examination, in January 1912, but to be put into practice during the whole life's work.

It should perhaps be put on record that there is absolutely no difference of merit whatsoever in being placed in Division A or in Division B. A first class in one is as good as a first class in the other. The two Divisions are only kept up for the convenience of certain Public Authorities.

C. R. FIELDER,	}	<i>Examiners.</i>
OWEN THOMAS,		
JOHN W. ODELL,		
W. CRUMP,		
EDWARD WHITE,		
E. BECKETT,		
W. WILKS.		

DIVISION A.

Class I.

1. W. H. Thomas, 45 Bennerley Road, Wandsworth Common.
2. Stephen Watson, 108 Fernbrook Road, Lewisham.
3. J. Hurley, 141 Trundley's Road, Deptford.

Class II.

1. G. Hodsdon, 115 St. Asaph Road, Brockley.
2. J. Chapman, 41 Finland Road, Brockley.

DIVISION B.

Class I.

1. H. W. Hotten, 76 Harrowgate Road, South Hackney.
2. E. C. Moody, 18 Warham Street, Kennington Park.
3. A. Chipperfield, 502 Southwark Park Road, Rotherhithe.
4. E. A. Duley, 32 Gwennyth Street, Cathys, Cardiff.
5. R. A. Dummer, 5 Mortlake Terrace, Kew.
6. J. Wigg, 194 Dunstan's Road, East Dulwich.
7. G. Baker, 48 Seaford Road, South Tottenham.

8. W. H. Radley, 16 Sach Road, Mount Pleasant Lane, N.E.
9. H. Spashett, 36 Inworth Street, Battersea.
10. C. E. Lewis, Martha Cottage, Lewisham.
11. E. Saunders, Rose Cottage, French Street, Sunbury.
12. E. W. Vince, 7 Cunersdale Road, Hither Green, S.E.
13. Ernest Hickford, Lauderdale House, Highgate Hill.

Class II.

1. { C. H. Harris, 298 Kew Road, Kew.
W. G. Knight, 2 Friar's Road, East Ham.
3. W. M. Salway, 22 Chester Road, Highgate.
4. R. F. Maythorn, 72 Harrogate Road, South Hackney.
5. R. Smith, 119 Dynevor Road, Stoke Newington.
6. { F. Longmire, 50 Victoria Road, Clapham Common.
E. Staples, Ivy Cottage, Rolfe Road, Charlton.
8. J. Jepps, 128 Dartmouth Park Hill, Upper Holloway, N.
9. A. Morley, 16 Sidworth Street, Hackney.
10. H. E. Mitchell, 45 St. James's Road, Brixton.
11. C. A. Turner, 2 River Cottages, Chase Side, Enfield.
12. P. J. Thomas, 22 Rutland Road, South Hackney.
18. { G. Hill, 31 Thurlow Hill, Dulwich.
W. J. C. Kemp, 100b Hindman's Road, East Dulwich.
F. Williams, 11 Royal Street, Lambeth.
16. A. H. J. White, 253 Sandycombe Road, Richmond.
17. G. T. Joiner, 4 Thorpe Road, South Tottenham, N.
18. W. Power, 152 Old Ford Road, Victoria Park, N.E.
19. W. Atkey, 42 Plimsoll Road, Finsbury Park, N.
20. { A. E. Baggs, 5 Bushwood Road, Kew.
W. H. Ricketts, 23 Chaplin Street, Forest Hill.
22. { F. C. Love, 142 High Street, Collier's Wood, Merton.
R. W. Boyle, 162 Sunnyside Road, Streatham.
24. R. T. Pike, 1 Elam Street, Lilford Road, Camberwell.
25. { J. Crombie, 3 Milton Chambers, Cheyne Walk, Chelsea.
J. Pepper, 3 Odger Street, Battersea.
27. { G. T. Wiltshire, 67 Swinnerton Street, Homerton.
W. Good, 34 Glenferrie Road, St. Albans.
29. C. R. Y. Peck, 502 Southwark Park Road, Rotherhithe.

Class III.

1. { H. Mouser, 4 Lauderdale House, Highgate.
S. Coxell, 75 Brantley Road, Witton.
8. { H. Herne, 171 Railton Road, Herne Hill.
N. W. Lewis, 177 Shardeloes Road, New Cross.
C. V. Lambourne, 72 Clive Road, Dulwich.
6. R. Streatfield, 32 Coombe Road, Upper Sydenham.
7. W. H. Jeffery, 35 Brightfield Road, Lee Green.
8. W. Poyser, 34 Glenwood Road, Harringay.

- 9. { G. T. Edney, 7 Nursery Cottages, Leyton.
H. C. Davis, Lloyd Park, Walthamstow.
- 11. { G. Canning, 12 Bellhaven Street, Bow.
C. T. Harris, 267 Deptford Lower Road, S.E.
- 13. W. Cooper, 6 Castle Yard, Highgate.
- 14. { H. W. Veaser, 9 Chatham Road, Wandsworth Common.
J. W. Webb, 16 Reform Street, Battersea.

II. GENERAL EXAMINATION.

APRIL 5, 1911.

SENIORS : OVER 18 YEARS OF AGE.

TWO HUNDRED AND TWO candidates entered for the Society's Senior General Examination, held on April 5, 1911. Four of these, however, were unable to present themselves on the appointed date.

The Examiners, the Rev. Professor Henslow, V.M.H., and Mr. James Douglas, V.M.H., report that of the Senior candidates obtaining a place in the Pass List, 33, or 16 per cent., secured places in the first class; 95, or 48 per cent., in the second class; while 69, or 35 per cent., appear in the third class. Only one candidate failed altogether. The same standard of marking and of class division as used in former years have been retained.

The answers of the candidates in the first class were in many cases remarkably good, but there were two or three points which they frequently described erroneously. Thus, *transpiration* was generally said to be due to temperature, whereas it is the red and violet rays of *light* which especially affect it. *Heat*, on the other hand, produces *evaporation*. Respiration, too, is stimulated by heat and not by light.

"Bast" fibres are not formed by the cambium, but by the pericycle outside the soft part or phloem.

We are glad to see there is a strong tendency to realize the importance of the study of the adaptation of plants, both in nature and horticulture.

The papers in Section B (horticultural practice) were quite up to the average of previous years. Generally speaking, a good knowledge was shown of manures and their chemical composition—matters which must be of considerable value in the practical work of the garden.

Most of the candidates displayed a good practical knowledge of hardy-fruit cultivation and the various systems of training fruit-trees on walls.

There is, however, still a tendency amongst the candidates when answering a question to range outside the subject-matter of the question itself. Some of the candidates do not read the instructions carefully; it is distinctly stated that eight questions only may be answered—four from Section A and four from Section B. It is therefore a waste of time to write answers to more than four in each section, as some candidates in the Senior division have done. Before answering any question candidates should give it very careful consideration. Some of the questions are in two parts, dealing with different details of the work. The two parts ought not to be mixed up, but each detail be given clearly in its right order and sequence.

The Examiners wish to acknowledge the care taken to comply with the rules laid down for the examination, especially in details such as answering each question on a separate sheet of foolscap, whereby much labour has been saved them.

JUNIORS: UNDER 18 YEARS OF AGE.

Of sixty-eight Juniors, four were placed in the first, eighteen in the second, twenty-five in the third, and nineteen in the fourth class.

There were one hundred and twelve Juniors in 1910. We regret to see this reduction, the more so since it appears that those responsible for the entry of Juniors had, in a large number of cases, omitted to acquaint themselves with the date of the examination until it was over, although the syllabus was issued nine months beforehand.

A little more attention should be paid to the spelling of botanical terms. Thus *Chlorophyll* proved a general stumbling-block—one candidate spelling it "Clorafal."

W. WILKS, *Secretary*.

SENIORS.

Class I.

1. Grover, G. M., Studley College, Warwickshire.
2. { Boraston, L. A., Arlesey House, Hitchin, Herts.
Hart, J. W., University College, Reading.
Taylor, E. R., Studley College, Warwickshire.
5. { Hollman, P., Holwoods, Fulbourn, Cambs.
Murray, G. L., Horticultural College, Swanley.
Powell, D. J., R.H.S. Gardens, Wisley.
Titchmarsh C. C., Westbrook Memorial, Heston, Middlesex.
9. { Bailhache, C. H., University College, Reading.
Clarke, E. E., Thatcham Fruit Farm, Newbury.
Cooke, M. B., The Cottage, Lyne, Chertsey.
Henry, M. I., Thatcham Fruit Farm, Newbury.
19. { Kitchin, J. M., Horticultural College, Swanley.
Oldham, C., 32 Gwennyth Street, Cathays, Cardiff.
Reeves, J., Overton, York Avenue, Wolverhampton.
Rooksby, A. R. N., 5 Castlegate, Grantham, Lincs.
Thomson, A. M., Horticultural College, Swanley.
White, W. C., The Gardens, Brocket Hall, Hatfield, Herts.
20. { Briggs, I. G., Stoke Farm, Bromsgrove.
Compton, G., University College, Reading.
Duley, E. A., 32 Gwennyth Street, Cathays, Cardiff.
21. { Middleton, R., Studley College, Warwickshire.
Sharpe, K. M. M., 15 Talbot Road, Highgate, N.
Toogood, S. L., University College, Reading.
Tweedie, H. M., 4 Trevana, Kingsbridge, Devon.

- Brunton, A. S. A., Château Châtelaine, Geneva, Switzerland.
 Cross, G. H., Studley College, Warwickshire.
 Denison, R., Thatcham Fruit Farm, Newbury.
 Edmonds, M. E., Studley College, Warwickshire.
 26. Gibson, G. W., R.H.S. Gardens, Wisley.
 Khan, M. A., 3 Harlington Lane, Mexborough, Rotherham.
 Norman, H. P., 69 Gloucester Road, Kew.
 Thornton, E. R., Horticultural College, Swanley.

Class II.

- Brown, W., Metropolitan and City Police Orphanage, Twickenham.
 Bunge, E., Château de Calixberghe, Schooten, Antwerp, Belgium.
 Clapp, W. A., Studley College, Warwickshire.
 Dodgshun, M., Studley College, Warwickshire.
 1. Elsey, C. W., Warblegate Lodge, Colwood Bolney, Hayward's Heath.
 Jennings, H. G., 38 Telford Road, Rodbourne, Swindon.
 Luis, G. M., Horticultural College, Swanley.
 Wilkie, V. J., Arlesey House, Hitchin, Herts.
 Bowyer, F., R.H.S. Gardens, Wisley.
 Dummer, R. A., 5 Mortlake Terrace, Kew, Surrey.
 Evatt, H., Leicester Road, Anstey, Leicester.
 Grant, G., The College, Holmes Chapel, Cheshire.
 9. Haarer, A. E., R.H.S. Gardens, Wisley.
 Jenkins, L., Horticultural College, Swanley.
 Little, W. B., Rydal House, Petteril Street, Carlisle.
 Lodge, W. H. H., Deal Villa, Kennard Road, Friern Barnet, N.
 Mackintosh, C. T., R.H.S. Gardens, Wisley.
 Waite, B. E. W., Elmwood School of Gardening, Cosham, Hants.
 Birkinshaw, F., 69 Gloucester Road, Kew, Surrey.
 Ericsson, K., Studley Cottage, Warwickshire.
 Garlick, W., Elmcroft Cottage, Westergate, Chichester.
 Harris, J. B., R.H.S. Gardens, Wisley.
 Henry, I. M., Thatcham Fruit Farm, Newbury.
 Hooper, C. M., Glinton, Redhill, Surrey.
 Hudson, H. W., Highfield, Gloucester Road, Kingston-on-Thames.
 Johnstone, A., Joyce Grove Gardens, Nettlebed, Henley-on Thames.
 19. Judd, W. H., 361 Sandycombe Road, Kew Gardens, Surrey.
 Lynch, R. S., 17 Dagmar Road, Kingston Hill, Surrey.
 Mason, H., South Newton, Salisbury.
 Negus, O., Horticultural College, Swanley.
 Paull, W. E., 3 Cadogan Terrace, Mount Pleasant Road, Camborne.
 Perry, S. F., R.H.S. Gardens, Wisley.
 Purdon, J., Brookfoot, Horsforth, Leeds.
 Roberts, L. P., West Hill Lodge, Westcott, Dorking.
 Shakespear, M. W., Studley College, Warwickshire.

- Baron, W., 1 Lindley Street, Little Lever, Bolton, Lancs.
 Evetts, L. B., Elmcroft Cottage, Westergate, Chichester.
 Figgis, G., The Yews Lodge, White Hill, Bletchingley.
 Foster, H. L., R.H.S. Gardens, Wisley.
 Gibson, S. M., Horticultural College, Swanley.
 Hebblethwaite, E. C., 8 Wellington Road, Oxton, Cheshire.
 36. Hendry, D., c/o Falconer, 9 Goldenacre Terrace, Edinburgh.
 Hurd, G. C., Horticultural College, Swanley.
 Kittle, H. E., University College, Reading.
 Moss, H., 12 Park Avenue, Chelmsford.
 Osborne, P. V., Technical School, Chelmsford.
 Rossiter, P., R.H.S. Gardens, Wisley.
 Tolson, G., Elmcroft Cottage, Westergate, Chichester.
 Tribe, H., 6 Hedgley Street, Lee, S.E.
 Coombes, J., 3 Laburnum Terrace, Long Ashton, Bristol.
 Cooper, H. S., University College, Reading.
 Langton, R., The College, Holmes Chapel, Cheshire.
 50. Platt, J., Glory View, Tower Hill, Dorking.
 Stokes, E. W., R.H.S. Gardens, Wisley.
 Taylor, C. E., Cedar Hall Lodge, Frenchay, Bristol.
 Trott, C., The Gardens, Galloway House, Garlieston, Wigtownshire.
 Colman, D., Holmesdale, Burgess Hill, Sussex.
 Davies, J. K., Hurtmore Croft, Godalming, Surrey.
 Goater, W., Horticultural College, Swanley.
 57. Johnson, T., R.H.S. Gardens, Wisley.
 Papworth, L. J., 35 Kings Road, Kingston-on-Thames.
 Ramsbottom, J. K., 4 Norroy Road, Putney, S.W.
 Baxendale, H., The Gardens, Wykehurst Park, Bolney, Hayward's Heath.
 Beale, H. E., R.H.S. Gardens, Wisley.
 Burton, K., University College, Reading.
 Carran, E., Folieu, Maughold, Isle of Man.
 Chapman, A. J., Upper Mixed School, Hazlemere, High Wycombe.
 Dent, T., Belton Gardens, Grantham, Lincs.
 63. Faulkner, J. W., 2 Thorn Grove, Albert Road, Hale, Cheshire.
 Fenoulhet, G., 25 Avenue Road, Trowbridge, Wilts.
 Lamb, A., 9 Grove Terrace, Squires Lane, Finchley, N.
 Payne, G. H., The Cottage, Bushby, Leicester.
 Samways, H., Maesybont, Llandebie, Carmarthenshire.
 Scadding, W. C., 17 Redfield Road, Midsomer Norton, Somerset.
 Thompson, J. A., Molesey Road, Hersham, Walton-on-Thames.
 Wallace, J. C., 253 Sandycombe Road, Richmond, Surrey.
 Andrews, S. T. G., 33 Lichfield Street, Rugeley, Staffs.
 Cartmell, T., Station Road, Thornleigh Cottage, Poulton-le-Fylde.
 77. Grinham, F. B., The Nurseries, West Hill, Winchester.
 Henry, D. G., 3 Meadowbank Crescent, Edinburgh.
 Mears, L. E., Thatcham Fruit Farm, Newbury.

77. { Patrick, P. S., R.H.S. Gardens, Wisley.
 Sanders, J. W., Newdigate Rectory, Surrey.
 Stewartmoore, K., Studley College, Warwickshire.
 Ashmore, S., 14 Lyndhurst Terrace, New Eltham, Kent.
 Biggs, E. M., 340 Kew Road, Kew, Surrey.
 Coles, F. S., Devonian, The Shrubbery, Weston-super-Mare.
 85. { Hitchcock, W., R.H.S. Gardens, Wisley.
 Holt, G. E., Lilac Cottage, Dunham Town, Altrincham.
 Hunter, T., 34 Alexandra Road, Richmond, Surrey.
 Wallace, E. E., Craigneuk, Gilmour Road, Edinburgh.
 Douglas, A. E. M., Horticultural College, Swanley.
 92. { Gardiner, G. F., 37 Gloucester Road, Kew.
 Prentice, W., The Gardens, Uley, Dursley, Glos.
 Short, W. J., 30 Landseer Road, Bush Hill Park, Enfield.

Class III.

1. { Jarrett, J., Queen's Park, Harborne, Birmingham.
 Jeffery, C., R.H.S. Gardens, Wisley.
 Reid, E. J., Studley College, Warwickshire.
 Taylor, H. J., East Lodge, Bonskeid, Pitlochry, Perthshire.
 Baskin, W., 3 Holly Cottage, College Ride, Bagshot, Surrey.
 Cook, S. R., 12 Berkeley Road, Westbury Park, Bristol.
 Corbett, C., 11 York Street, Altrincham.
 Downer, H. E., 5 Mortlake Terrace, Kew, Surrey.
 5. { Hope, J., 1 Teviotdale Place, Edinburgh.
 McCreadie, E. F., Holme Villa, Ferry Road, Leith, N.B.
 Maxwell, D. F., R.H.S. Gardens, Wisley.
 Nation, H., Horticultural College, Swanley.
 Rule, J. E., The Nurseries, Burton Constable, Hull.
 Wethey, M. C., 4 Cunliffe Villas, Manningham, Bradford.
 Barton, J. D., Royal School for Deaf and Dumb Children.
 Margate.
 Cocks, H., 2 Sea View Terrace, Beacon Hill, Camborne.
 Everitt, M., Horticultural College, Swanley.
 Flanigan, P. S., 8 Arch Grove, Long Ashton, Bristol.
 Frazer, H., Marabout, Letchmore Heath, Watford.
 15. { Goodrich, W. J., 8 Kew Bridge Road, Brentford, Middlesex.
 Jönssen, A., Signestorp, Kaltarp, Sweden.
 Lawson, H., 52A Vickerman Street, Hopwood, Halifax.
 Maxwell, A. J., Eastfield Villa, Flax Bourton, Bristol.
 Rason, P. A., The College, Holmes Chapel, Cheshire.
 Sadd, A. H., Westerfield, Ipswich.
 Smith, A. O., The Gardens, Gregynog, Newtown, Mont.
 Anderson, D., The Gardens, Drummond Castle, Crieff, N.B.
 Gantner, L. J., The College, Holmes Chapel, Cheshire.
 Gooding, J. H., Trevisson Gardens, Flushing, Falmouth.
 27. { Guerin, B. C., 2 Le Friquet, St. Martin's, Guernsey.
 Hibbins, W. R., 63 St. Clements, Oxford.
 Terrell, M. & B., Horticultural College, Swanley.

33. { Grainger, T., 2 William Street, New Skelton-in-Cleveland.
 { Smith, A. E., Poplar Cottage, Boulge, Woodbridge.
35. { Bullock, T., Verandah Cottage, Kew.
 { Cannon, H. A., 5 Mortlake Terrace, Kew.
 { Walley, V., The College, Holmes Chapel, Cheshire.
 { Hayton, W., Bridgend, Craigmillar, Midlothian.
 { Henderson, G. S., 4 High Street, Penicuik.
38. { Monk, L. J., Pyrford Court Gardens, Woking.
 { Smith, J. T., 93 Sandycombe Road, Richmond, Surrey.
 { Spence, J., The Gardens, Wyresdale Park, Scorton, Lancs.
 { Tayler, F. W., 25 Third Cross Road, Twickenham.
44. { Arnot, D. B., 11 Southwood Lane, Highgate, N.
 { Johnson, N., R.H.S. Gardens, Wisley.
 { Scott, E. W., 135 Elm Road, Kingston-on-Thames.
 { Wartmann, O. G. M., The College, Holmes Chapel, Cheshire.
48. { Oliver, G., 60 Gaia Lane, Lichfield, Staffs.
 { Penfold, E. E., 5 Old Road, Lee, S.E.
 { Rumble, W. J., Golding's Cottages, Great Warley, Essex.
 { Shell, L. A., R.H.S. Gardens, Wisley.
 { Yarnall, J. H., 3 Sydenham Terrace, Trinity Street, Tewkesbury.
53. { Charlotte, F. H., South View, Yarnton, Oxford.
 { Hay-Edwards, B., Thatcham Fruit Farm, Newbury.
55. { Gill, C. J. A., 317 Woodstock Road, Oxford.
 { Normanton, S. J., 36 Boundary Street, Heckmondwike.
 { Young, P., 35 Hatton Road, Cheshunt, Herts.
58. { Ellwood, H., Coombe Wood Nursery, Kingston Hill, Surrey.
 { Ely, G., Carbrook House Gardens, Larbert, Stirlingshire.
 { Glover, F., The Gardens, Headington Hill Hall, Oxford.
 { Roger, J. J., Church Cottage, Cowley, Middlesex.
62. Ashley, H. W., 86 Poplar Walk Road, Herne Hill, S.E.
63. Oliver, M., 1 Belgrave Terrace, Corstorphine, Edinburgh.
64. Jarlett, E., 18 Cranmer Road, Teddington, Middlesex.
65. { Lloyd, S. C., Perry Hill, Belmont Del, Hereford.
 { Roberts, A., Waterloo Place, Kew Green.
67. Langridge, J. W. T., Oakwood Grange, Ockley, Surrey.
68. { Dexter, A., Thatcham Fruit Farm, Newbury.
 { Fawcett, W., Aldborough, Boro'bridge, York.

JUNIORS.

Class I.

1. Elsdon, H. C., Technical School, Chelmsford.
2. Germany, H., Technical School, Chelmsford.
3. Harding, F. R., Industrial School, Chelmsford.
4. Hummerston, H., Technical School, Chelmsford.

Class II.

1. Watson, M. R., Romano, Corstorphine, Midlothian.
2. { Chambers, G., 56 Lenthall Road, Dalston, N.E.
 { Jordan, D. A., Technical School, Chelmsford.
 { Narroway, H., 66 Islip Road, Sunnymeade, Oxford.

5. Kelly, A., Chadwick Memorial School, Stanwix.
6. { Darrington, W. G., Technical School, Chelmsford.
Hayman, C., 63 Percy Road, Shepherd's Bush, W.
Pearce, C., 82 Harwood Road, Fulham, S.W.
9. Dixon, R., Bank Ground, Coniston, R.S.O., Lanes.
10. Cule, G., Shop House, Fidlais Road, Llanishen, Cardiff.
11. { Anderson, E., Chadwick Memorial School, Stanwix.
Nimmo, J., 36 Grove Street, Edinburgh.
13. Richards, J., White Oak School, Swanley.
Atkins, B., 27 Derby Road, Tolworth, Surbiton.
Brackstone, E., Industrial School, Chelmsford.
14. { Girling, C. E., Technical School, Chelmsford.
Heathcote, P., Stoke Farm, Bromsgrove.
Henningham, E. G., Stoke Farm, Bromsgrove.

Class III.

1. { Green, W., Stoke Farm, Bromsgrove.
Jones, J. H., Stoke Farm, Bromsgrove.
3. { Horscroft, G., Technical School, Chelmsford.
Walker, S., Chadwick Memorial School, Stanwix.
5. Brown, F., Industrial School, Chelmsford.
6. { Green, T. H., Stoke Farm, Bromsgrove.
Major, E., Knipe Ground, Monk Coniston, Lanes.
8. { Copleston, G. E. A., White Oak School, Swanley.
Ledger, J. W., Stoke Farm, Bromsgrove.
Stewart, J., Industrial School, Chelmsford.
Twinney, M. M., 11 Donald Street, Roath Park, Cardiff.
12. { Harrington, A., Industrial School, Chelmsford.
Pearce, W., Industrial School, Chelmsford.
Richmond, W., Eastfield Villa, Flax Bourton, Bristol.
15. { Pautard, P., White Oak School, Swanley.
Shields, F., Chadwick Memorial School, Stanwix.
Bardwell, H., Industrial School, Chelmsford.
Fairclough, T., White Oak School, Swanley.
17. { Jeffery, E., Industrial School, Chelmsford.
Savage, S. W., Stoke Farm, Bromsgrove.
Selves, C., White Oak School, Swanley.
22. { Brennan, A. E., White Oak School, Swanley.
Moyes, H., Stoke Farm, Bromsgrove.
Rider, R. C., White Oak School, Swanley.
Surrey, A., Stoke Farm, Bromsgrove.

Class IV.

1. { Hoppus, A., White Oak School, Swanley.
Porter, G. E., Industrial School, Chelmsford.
Thomas, I., 10 Deri Road, Penylan, Cardiff.
4. { Clark, W. C., Industrial School, Chelmsford.
FitzGerald, A., Letheringsett Gardening Schools, Holt.

- Harrington, T., White Oak School, Swanley.
- 4. { Leddra, H., White Oak School, Swanley.
Smith, G., White Oak School, Swanley.
- 9. { Bonner, W., Chadwick Memorial School, Stanwix.
Stamp, J., Chadwick Memorial School, Stanwix.
- 11. Johnson, T., White Oak School, Swanley.
- 12. { Ashton, G. J., White Oak School, Swanley.
Effland, T., White Oak School, Swanley.
Haley, T., Chadwick Memorial School, Stanwix.
- 15. { Haley, P., Chadwick Memorial School, Stanwix.
Penney, T. F., White Oak School, Swanley.
- 17. Braithwaite, G., White Oak School, Swanley.
- 18. Johnston, P., Chadwick Memorial School, Stanwix.
- 19. Griffin, D., White Oak School, Swanley.

III. EXAMINATION OF SCHOOL TEACHERS IN COTTAGE AND ALLOTMENT GARDENING.

APRIL 26, 1911.

FOUR HUNDRED AND NINETY-SEVEN Candidates presented themselves for the Examination of School Teachers in Cottage and Allotment Gardening held on April 26, 1911, being an increase of 292 over the entries for 1909.

The Examiners, Mr. F. J. Chittenden, F.L.S., Mr. Alexander Dean, V.M.H., and Mr. Jas. Hudson, V.M.H., report that whilst many excellent replies to the questions were sent in, it was all too obvious that some of the younger candidates had presented themselves without having obtained any real knowledge, either theoretical or practical, of simple gardening. Candidates may like to test their knowledge in this way, but it would be far better to form some actual acquaintance with gardening beforehand.

Subjects having relation to information obtained from books offered much less difficulty to many candidates than did those of an essentially practical character. Practical knowledge of the ordinary routine of cottage and allotment gardening is absolutely essential to any candidate. In reference to the sowing of seeds, for example, the word "planting" was frequently used in error.

Some candidates elaborated their earlier answers much too fully, thus leaving too little time for others. It is advisable to practise on the questions set in previous examinations, and thus test both one's knowledge and the time taken to express it on paper. In several instances the candidates did not read the questions fully before attempting a reply, thus losing valuable time.

Some candidates, on the other hand, answered the questions in a thoroughly practical manner, evidently the outcome of practice and close observation. The Examiners have much pleasure in noting this. The knowledge that can be imparted by such teachers is invaluable, and it must eventually lead to a great improvement taking place in the cultivation of cottage and allotment gardens when their scholars grow up and have gardens of their own to cultivate.

Those who sat for this examination and have not been so successful as they could wish are strongly advised to make another attempt. Many such show considerable promise.

In Section B the last two questions were as a rule well answered. Only a few attempted answers to Questions 11 and 12. In all cases, however, many of the candidates failed to give any—or any adequate—reasons for the practice they advocated. There seemed to be a very general misunderstanding of the structure and function of the cambium,

exploded fallacies and mistaken ideas cropping up in many of the answers. Candidates are urged to pay more attention to the physiology of plants, so as to be in a position to give intelligent reasons for cultural operations.

W. WILKS, *Secretary*.

Class I.

1. Alderton, E., Grange House, Rathfarnham, Co. Dublin.
2. Lucas, E., Westwood, Mary Road, Stechford, Birmingham.
3. { Hudson, H. W., Highfield, Gloucester Rd., Kingston-on-Thames.
O'Nious, R., 77 The Kingsway, East Sheen, S.W.
Seeviour, G. C., Woodbury, Green Lane, Sutton, Surrey.
6. { Abel, B. G., The School House, Cradley, Malvern.
Slee, T. J., Pinehurst, Braunton, North Devon.
8. { Dawes, F. W., Victoria Street, Burton Latimer, Kettering.
Lamacraft, G. H., 1 Victoria Terrace, Bovey Tracey, Devon.
Radford, E. J., 81 Market Street, Earlestown, Lancaster.
Simmonds, A., 8 St. Mark's Villas, St. Mark's Road, Mitcham.
12. { Carter, E., Station Road, Burton Latimer, Kettering.
Royce, A. M., School House, Ringland, Norwich.
14. { Clegg, T., Glyn Siriol, Llangefni, Anglesey.
Osborne, O. J., 75 Mark Road, Noel Park, Wood Green, N.
Summers, O. A., Tamworth-in-Arden, Birmingham.
17. { Chance, C., 70 Upper St. Mary's Road, Warley, Birmingham.
Pudney, H. W. J., The School House, Chilham, Canterbury.
19. { Jones, F., School House, Chudleigh, Devon.
Knogle, J., School House, Llangathen, Golden Grove, Carmarthen.
21. Morton, A. J., 4 McIntyre Road, St. Johns, Worcester.
22. { Bristow, E., 74 Ladbroke Road, Redhill, Surrey.
Millner, G. H., 15 Greenside Lane, Droylsden, Manchester.
Rowlands, B., School House, Cheriton, Alresford, Hants.
25. { Bulbeck, E. H., 23 Meeching Road, Newhaven, Sussex.
Gridley, G. C., Post Office, Newmarket, Stroud, Glos.
27. { Paull, W. E., 3 Cadogan Ter., Mount Pleasant Rd., Camborne.
Sale, F., 86 Fairfax Road, Haringay, N.
Samways, H., Maesybont C. School, Llandebie, Carmarthen.
Smart, E. T., 17 Victoria Street, Wolverton, Bucks.
Torrance, W. G., County Technical School, Stafford.
32. { Crosland, H. M., Bourne View, Bath Road, Thatcham, Berks.
Downs, C. A., 20A Standard Road, Hounslow.
Logan, J. E., Dufton, Appleby, Westmoreland.
Spencer, W. J., 67 Oswald Road, Southall.
36. { Bell, W., Hill Crest, Station Road, Brimington, Chesterfield.
Collinson, G. L., Holmbury, Lynwood Road, Redhill.
Eades, F. D., 17 Laundry Lane, Belgrave, Leicester.
Fancourt, W. L., 19 Wyndham Road, Kingston-on-Thames.

- Harris, A. C., Station Road, Burton Latimer, Kettering.
 Kay, H., Long Lawford C. School, Rugby.
 36. Lewendon, F. J., 20 Ridley Road, Harlesden, N.W.
 Norwood, G. A. H., 204 Iffley Road, Oxford.
 Seeley, W. F. E., 148 Hatfield Terrace, Emscote, Warwick.
 Coy, A. J., Council School, Marden, Kent.
 Stanley, H. D., School House, Staplehurst, Kent.
 45. Tillen, C. C. L., Wilby House, Irchester, Wellingboro'.
 Towndrow, A. E., 39 Bernard Avenue, West Ealing, W.
 Wilson, J. J., Arvon House, Elmswell, Bury St. Edmunds.

Class II.

- Barton, C. J., 25 Radcliffe Avenue, Harlesden, N.W.
 Boddy, G. H., Langho School House, Whalley, Lancs.
 1. Evatt, H., Leicester Road, Anstey, Leicester.
 Pearson, H. E., Chilthorne, Yeovil.
 Pile, H. E., Scudamore School, Hereford.
 Corbett, J., Willowmore, Sedgley, Dudley.
 Gates, W. R., 20 King Alfred Terrace, Winchester.
 6. Kenwright, F. H., 109 Clock Face Road, St. Helens, Lancs.
 Luck, R., Brinkhill Lane, S. Ormsby, Alford, Lincs.
 Weston, A., 70 Shrewsbury Road, New Southgate, N.
 Brook, W. H., School House, Allensmore, Hereford.
 Carpenter, S., 19 Green End, Kingsthorpe, Northampton.
 Fordham, R. R., Station Road, Pottton, Sandy, Beds.
 Handover, A. C. P., 54 Clare Road, Hounslow, Middlesex.
 Hobday, L. H. B., 14 Roman Road, Colchester.
 Hollman, P., Holwoods, Fulbourn, Cambs.
 11. Holmes, R. H., 70 Eamont Gardens, West Hartlepool.
 Kirk, R. F. H., 117 Clementina Road, Leyton.
 Pearson, F. A., 33 Chesham Road, Norbiton, Surrey.
 Smith, C. H., 26 Parkside, Seacombe, Wallasey, Birkenhead.
 Stanway, H. G., 32 Livingstone Road, Gillingham, Kent.
 Swaine, J. E., Blackpool Road, Carleton, Poulton-le-Fylde.
 White, W. H., George Street, Belper.
 Gollidge, G. H., Haughton School, St. Saviourgate, York.
 Hortill, A., Gorge Road, Hurst Hill, Bilston, Staffs.
 24. Parker, E. E., Barnwell, Oundle, Northants.
 Potter, W. E. H., The Hut, Kingham, Chipping Norton.
 Turner, L., 100 Stanley Road, Earlsdon, Coventry.
 Wells, W. H., Stoneleigh C. E. School, Kenilworth.
 Collis, A. D., 2 Crown Villas, Ravens Lane, Gt. Berkhamsted.
 30. Fletcher, G. S., School House, Bampton Aston, Oxon.
 Mason, H., South Newton, Salisbury.
 33. Bishop, J. E., County Technical School, Stafford.
 Smith, E. E., Yeo, Brambletye Park, Redhill.
 35. Box, G. D., Summercourt, Grampond Road, Cornwall.
 Brockbank, J. W., Shipton School, Beningborough, York.

- Cade, G. H., 2 Woodland Villas, Cromwell Avenue, Cheshunt.
 Dickins, E. W., Stockton, Rugby.
 Heath, L., County Technical School, Stafford.
 35. Marsden, W. E. F., Christ Church School, Coseley, Bilston.
 Morgan, A. S., Upper Lydbrook, Ross-on-Wye.
 Raby, E. E., The Gables, West Hallam, Derby.
 Taylor, J., 38 Rugby Street, Wolverhampton.
 Watton, G. B., Shaftesbury Cottage, Bisley, Surrey.
 45. Dicker, J. J., Brockweir Council School, Chepstow.
 Keller, A., Fern House, Binbrook, Market Rasen.
 Oyston, J., Jesmond, Queen's Road, Horley, Surrey.
 Pennington, C., York Street, Dunnington, York.
 Andrew, J. E., Church Street, Oughtibridge, Sheffield.
 Clarke, A. J., 6 Ashfield Road, Altrincham, Cheshire.
 Emery, J. A., Ty Hyfryd, Cinderford, Glos.
 Hill, F. H., 2 The Avenue, Chingford.
 49. Hunt, A. G., Marchwiell Schools, Wrexham.
 Lovell, L. G., 2A Culverley Crescent, Culverley Road, Catford.
 Loxton, A. E., 52 Clarendon Street, Leamington Spa.
 Roberts, E., Dalton-on-Tees, Darlington.
 Saunders, E. G., 46 Stanley Road, Lower Edmonton.
 Clemas, G. W., Ivydene, Church Road, Merton, Surrey.
 Cobbold, P. J., Littlebourne, Canterbury.
 58. Lodge, W. H. H., Deal Villa, Kennard Rd., Friern Barnet, N.
 Symons, A. B., 118 Merrivale Road, Bearwood, Birmingham.
 Thomas W. A., Pantgarw Villa, Llantwit Fardre, Pontypool.
 Forsey, S. R., Boys' School, Westerham, Kent.
 Holden, E., Hampton School, Evesham.
 63. Swallow, H., Farnley Hall Farm, Farnley, Leeds.
 Thompson, O., Sutton Bonington, Loughborough.
 Wade, W. J., Eden Villa, Ebley, Stroud, Glos.
 Yeomans, S. C., 113 Park Road, Loughborough.
 Blake, W. A., 34 Broughton Road, South Shields.
 Farr, H. C., School House, Charlwood, Surrey.
 69. Hughes, T. R., 46 Harcourt Avenue, Southend-on-Sea.
 Kennard, T., 19 Effingham Road, Reigate, Surrey.
 Summerton, W., 83 Shrubland Street, Leamington Spa.
 Balls, F. D., Thanet House, Sprowston, Norwich.
 74. Davies, F., Apsley Villa, Urban Road, Sale, Cheshire.
 Snell, C. H., 2 Clive Place, Penarth, S. Wales.
 Brown, E. J., 81 Victoria Road, Hebburn-on-Tyne.
 Gray, T. J. H., Witherley, Atherstone.
 Gregg, H. A., 79 Jeffcock Road, Wolverhampton.
 77. Haarer, A. E., 40 Earlsfield Road, Wandsworth Common.
 Hartley, C., The Schoolhouse, Shottery, Stratford-on-Avon.
 Hill, G., Edgefield House, Town Lane, Aylsham, Norfolk.
 Locker, H., 3 Vicarage Road, Teddington, S.W.
 Lord, G., Teesholme, Filey, Yorkshire.

77. { Taylor, H. T. M., Council School, Ashted, Surrey.
 Webster, G. H., School House, Oxspring, Penistone.
 Wilson, D., Windmill Lane, Belper, Derbyshire.
88. { Adams, H. J., Sargents Hill, Birmingham Road, Walsall.
 Burdett, J. O., Leicester House, Eastgate, Louth, Lincs.
 Collinson, H., Hornbury, Lynwood Road, Redhill.
 Cooper, A. G., 5 Hopton Road, Hereford.
 Holmes, E. O., 83 York Road, Ilford, Essex.
 Leeson, F., Corby, Grantham.
 Uglow, S., 37 South Road, Kingswood, Bristol.
 Woolnough, W., Elm Villa, Friston, Saxmundham.
96. { Anderson, F., School House, Sharnford, Hinckley, Leicester.
 Burton, E. T., Woodside, Ruardean, Glos.
 Buttery, W., 4 John Street, Whitby, Yorks.
 Buttery, W. A., 36 Hope Street, West Bromwich.
 Crane, H. O., Ballygate, Beccles, Suffolk.
 Green, H. E. L., Gander Green Lane, Sutton, Surrey.
 Hedges, H. W., Chilson, Charlbury, Oxon.
 Jones, H. P., School House, Bowdeswell, Norfolk.
 Withers, R., School House, Stoborough, Wareham, Dorset.
105. { Arnold, A. E., 38 Princes Street, Peterborough.
 Blackwood, J., 161 Somerville Road, Small Heath, Birmingham.
 Frith, L., 14 Stanley Road, Meersbrook, Sheffield.
 Griffiths, A. E., High Street, Brierley Hill, Staffs.
 Groves, A., School House, Charminster, Dorchester.
 Hughes, J. H., Fern Bank, Grange Road, Ashton-on-Mersey.
 Legerton, C. W. S., Garland Road, Parkeston, Harwich.
112. { Legg, J. J., Brookside, Church Street, Tewkesbury.
 Lewis, S., 43 Egerton Road, Bishopston, Bristol.
 Simmons, J., Airedale, Gatton Park Road, Redhill, Surrey.
 Whitehouse, J., The Ackers, Latchford, Warrington.
116. { Bosworth, F. O., High Street, Bedworth, Nuneaton.
 Burraston, R. G., 249 Cartland Road, Stirchley, Birmingham.
 Chamberlin, G., Southery, Downham, Norfolk.
 Harris, H. J., 6 Keslake Road, Queen's Park, Kilburn, N.W.
 Pigo, M. E., Bridehead, Dorchester.
122. { Wilmut, F. S., Roselle, Vincent Avenue, Southampton.
 Allsopp, G. H., 58 Outram Street, Sutton-in-Ashfield.
 Chapman, A. J., Hazlemere, High Wycombe.
 Clatworthy, W. W., North Street, North Petherton, Bridgewater.
 Compton, A. S., 11 Claremont Terrace, Swanley, Kent.
 Conolly, E., Mansfield, Ringwood, Hants.
 Edwards, W., Schoolhouse, Castle Bromwich, Birmingham.
 Freeman, A. W., Fairfield, Upper Grange Road, Beccles.
 Hart, B. A., 2 Chestnut Villas, Ditton Hill, Surbiton, Surrey.
 Horne, E. H., Industrial Schools, Mayford, Woking.
 Jones, O., Enmore Green School, Shaftesbury, Dorset.
 Love, G. R., c/o Mrs. T. G. Davis, Eye Green, Peterborough.

- Mellor, W. S., School House, Bilborough, Notts.
122. Morgan, P. A., 59 Grovehill Road, Redhill, Surrey.
- Swift, L., Ashville, Berry Brow, Clayton Bridge, Manchester.
- Young, E., Bellecroft, St. Johns, Redhill, Surrey.
- Cuthbert, J., School House, Sibford Gower, Banbury.
- Halton, H., Newburgh, Southport.
- Hodgson, J. C., Stobswood Council School, Acklington.
- Piper, A. G., School House, North Holmwood, Dorking.
137. Porter, J. J., 4 Gathorne Road, Wood Green, N.
- Ricketts, J., 3 Park Row, Greenwich, S.E.
- Sidwell, W. T., 141 Clifton Road, Rugby.
- Spencer, J. E., 210 Stanhill Lane, Oswaldtwistle.
- Wilbraham, G. W., Eden Orphanage, Astley Bridge, Bolton.
- Wonnacott, A. J., Lower Trevethan, St. Day, Cornwall.
- Bott, F. B., School House, Broadwell, Moreton-in-Marsh.
- Bradford, G. H., 66 Thornbury Road, Spring Grove, Isleworth.
- Driver, A. E., Bridgend Nurseries, Stonehouse, Glos.
147. Gover, C. H., Lower Cockroad, Kingswood, Bristol.
- Irlam, L., 5 Mount Terrace, Droylsden, Manchester.
- Meek, B., Saleby, Alford, Lincs.
- Moss, J., Rose Cottage, St. Michaels-on-Wyre, Garstang.
- Witt, F. G., 10 St. Mark's Terrace, Saltney, Chester.
- Bell, J., Ivydene, Station Road, Lower Hagley, Stourbridge.
- Bell, J. A., 122 Worsley Road, Winton, Patricroft, Lancs.
- Carr, J., Foxholes, Horwich, Bolton, Lancs.
- Corah, F., School House, Ashfordby Hill, Melton Mowbray.
- Dennis, S. W. G., Selwood, Gloucester Road, Thornbury, Glos.
155. Ellson, P., 168 Hanover Road, Willesden Green, N.W.
- Harvey, C. A., School House, Ridgeway, Sheffield.
- Macfarlane, J. R., 21 Stanley Street, Mold, Flints.
- Mills, R. W., 27 Arundel Road, Littlehampton.
- Thrower, F., 68 Tamworth Road, Hertford.
- Warr, H., Bradford Abbas, Sherborne, Dorset.
- Worthing, R. C., 127 Galton Road, Smethwick, Staffs.
- Bartter, A. S., School House, Horn Street, Shorncliffe, Kent.
- Bowers, W., 255 Walsall Road, Darlaston, Staffs.
- Brandsen, W. J., North Stifford, Grays, Essex.
- Cooke, W. J., Industrial School, Balden Road, Birmingham.
- Hawkins, G., School House, Upper Heyford, Banbury.
- Miller, R. G., Brook House, Glemsford, Suffolk.
167. Rolling, W., Cropstone, Leicester.
- Rudge, P. R. H., Clovelly, The Drive, Tonbridge, Kent.
- Walker, J., Linden Cottage, Stocksfield-on-Tyne.
- Walker, J., School House, Wilton, Redcar, Yorks.
- Wild, H., 87 Crompton Street, Coldhurst, Oldham, Lancs.
- Williams, R., Bodevon, Nevin, N. Wales.
- Wintle, H. G., Highcroft, Woodville Road, Cinderford, Glos.

180. { Allwood, T. E., Bank Farm, Hurleston, Nantwich, Cheshire.
 Corry, W. P., Nuthurst, Horsham.
 Hall, H., 188 Church Street, Wolverton, Bucks.
 Hewett, W. J., 44 Albert Road, Hounslow, Middlesex.
 Jones, E. P., Independent School, Belthorn, Blackburn.
 Powell, J. H., 24 Palace Gardens, Enfield, Middlesex.
 Robson, J. G., School House, Horncliffe, Berwick-on-Tweed.

Class III.

- Barton, J., School House, Brafferton, Darlington.
 1. { Davies, J. J., Philip Street, Coseley, Bilston, Staffs.
 Price, R., Gorseleigh, Cobden Street, Wollaston, Stourbridge.
 Turton, F. H., Albert Road, Grappenhall, Warrington.
 Watson, R., 108 Wolverton Road, Stony Stratford.
 Wilkinson, J. J., Oakleigh, Aycliffe, Darlington.
 Beech, F. C., 262 High Street, Smethwick.
 7. { Burgess, A. T., 16 King's Road, Peckham, S.E.
 Corbridge, E. J., Manor Road, Rusthall, Tunbridge Wells.
 Dillamore, A., School House, Sambrook, Newport, Salop.
 Evans, A., Rosedale, Irthlingboro', Northants.
 Jones, A. F., Crowhurst, Lingfield, Surrey.
 Lloyd-Williams, R., 106 High Street, Connah's Quay, Flint.
 Mansbridge, F. W., 11 Church Road, Bagshot, Surrey.
 Moss, T., 23 Lyttelton Road, Aigburth, Liverpool.
 Slator, H., 70 Clarendon Street, Leamington Spa.
 17. { Burchell, A. E. J., Council Schools, Stonehouse, Glos.
 Cook, S. R., 12 Berkeley Road, Westbury Park, Bristol.
 Forster, H. H., Station Road, Frimley, Surrey.
 Moss, W., Chapel Lane, Coppull, Chorley, Lancs.
 Rowlands, H. J., School House, Cheriton, Alresford, Hants.
 Smith, A. E., Poplar Cottage, Boulge, Woodbridge.
 Stephenson, W. H., Bryn-y-mor, Leopold Road, Felixstowe.
 White, W. C., The Gardens, Brockett Hall, Hatfield.
 Bearden, S., 5 Albert Street, Milnrow, Rochdale.
 Booth, H., Codsall Post Office, Wolverhampton.
 Chant, T. W., School House, Chipstable, Wiveliscombe, Som.
 Clark, C., School House, Funtley, Fareham, Hants.
 Davies, H. B., 19 Thorpe Street, Old Trafford, Manchester.
 25. { Davies, T. B., Gate Villa, Sedgley, Dudley.
 Donnellan, G. T., 30 Stoney Stanton Road, Coventry.
 Duffield, J. T., 4 The Butts, Warwick.
 Enstone, A., 50 Morton Street, Leamington Spa.
 Evans, S. T., Virginia Villa, Wynols Hill, Coleford, Glos.
 Jones, J. D., 357 Cardiff Road, Aberdare, S. Wales.
 Parry, R. W., Council School, Llanbrynmair, Montgomery.
 37. { Baskin, W., 3 Holly Cottage, College Ride, Bagshot.
 Greig, W., Somerleyton, Lowestoft.
 Hogan, G. D., 24 Haybridge Avenue, Wellington, Salop.

- Papworth, L. J., 35 King's Road, Kingston-on-Thames.
37. { Robinson, W. R., 5 New Street, Vincent Square, Westminster.
 { Wilson, C. A., County Technical School, Stafford.
 { Worton, R. A., 261 Dunstall Road, Wolverhampton.
- { Faulkner, W. H., School House, Nutfield, Redhill.
 { Hardy, F. O., Freydey Cottage, Sutton-in-Ashfield, Notts.
44. { Heywood, G. W., 6 Pemberton Street, Church Road, Coseley.
 { Moulst, J., The Poplars, Styal, Manchester.
 { Smart, J. E., Kitwash, Heathfield, Sussex.
- { Adamson, J. G., Robinson Terrace, Byers Green, Co. Durham.
 { Brookes, A., 12 Gate Street, Burnt Tree, Tipton.
 { Clarke, C. W., Council School, Gt. Stambridge, Rochford, Essex.
 { Dell, W., 25 Park Square, Lancaster.
 { Griffiths, M. A., Wood Street Schools, Guildford.
 { Harris, W. F. E., School House, Great Horkesley, Colchester.
49. { Hart, T. J., Chynhale, Helston, Cornwall.
 { James, H. A., Prospect House, Cinderford, Glos.
 { Jones, R. E., 60 Emlyn Road, Redhill.
 { Morgan, J. G., School House, Almeley, Hereford.
 { Pine, H. H., 99 Hythe Road, Brighton.
 { Rock, S. W., 67 High Street, Bridgnorth, Salop.
 { Rowlands, G. W., Woodville, St. Paul's Road, Peterboro'.
 { Shelmerdine, J., School House, Raunds, Wellingborough.
 { Benton, J. W., White House, Featherstone, Wolverhampton.
 { Brown, W. T., 74 Lavender Hill, Enfield, Middlesex.
 { Griffiths, J. F., Sunnyside, Victoria Avenue, Grappenhall.
63. { Kear, B. M., Sunnyside, Belle Vue Road, Cinderford, Glos.
 { Lodge, J. L., Lamorby School House, Sidcup, Kent.
 { Wade, A., Essendene House, Oswaldtwistle, Accrington.
 { Wilkinson, C. E., Ivy House, Donington-on-Bain, Lincoln.
- { Appleton, A., Cloughton, S.O., Yorks.
 { Belgrove, W. A., School House, Orford, Suffolk.
 { Conduct, E. W., Spelsbury, Charlbury, Oxon.
 { Fitzjohn, H. R., 35 Bamber Street, Peterborough.
 { Forman, F., Well School, Alford, Lincs.
 { Hullah, M. C., The Woodlands, Tilstone, Cheshire.
70. { Hutton, M., Bourne Road, Alford, Lincs.
 { Lloyd, J. C., 59 Bond Road, Surbiton, Surrey.
 { Mann, F., 27 All Saints' Road, Peterborough.
 { Mawer, A. L., School House, Boroughbridge, York.
 { Rhodes, E. D., School House, Bodle Street Green, Hailsham.
 { Robinson, H. W., Thurlton, Loddon, Norwich.
 { Rudling, H. G., King Street, Mildenhall, Suffolk.
 { Walker, C., Herner Council School, Barnstaple.
- { Beavan, A. C. W., School House, Sutton Bridge, Wisbech.
 { Brayford, E., 243 Sneyd Road, Bloxwich, Walsall.
84. { Jarvis, W. C. L., Minster Lovell School, Witney, Oxon.
 { Scales, M., Woodlands, Bailiffe Bridge, Brighouse, Yorks.
 { Slaymaker, R. K., Boys' School, Middleton-Stoney, Bicester.

84. { Smith, J. T., 6 York Terrace, Frimley Road, Camberley.
 Sparkes, E. A., Gloucester Lodge, Chapel Road, Worthing.
 Rawson, F. J., South View, Station Road, Belmont, Sutton.
 Rigg, H. E., Kinloch Cottage, Sidlesham, Chichester.
- { Cannell, E. A., 84 St. Mary Street, Latchford, Warrington.
 Gore, J., 5 Falkland Road, Dorking.
 Greenbank, F., 2 Oulton Road, Lowestoft.
93. { Grinter, F. G., Hare Villas, Long Melford, Suffolk.
 Lee, S., New Road, South Darenth, Kent.
 Peace, J. O., School House, Mid Yell, Shetland.
 Sandford, T., 103 Chevening Road, Kilburn, N.W.
 Adams, H., The Elms, Blyton, Gainsborough, Lincs.
- { Baxter, J., Sunnyside, Bartley Green, Birmingham.
 Brown, W., Police Orphanage, Twickenham.
100. { Markham, E., 2 Southlands Road, Kettering.
 Stead, R. T., School House, Romsey, Hants.
 Taylor, A. P., Gowan Cottage, Urban Road, Sale, Manchester.
 Woodbridge, A. W., 151 Cromwell Road, Peterborough.
 Barrett, W., 39 Ivy House Lane, Coscley, Bilston, Staffs.
- { Fisher, F., The Schoolhouse, Rowington, Warwick.
 Hitchens, A. E., 78 Frensham Road, Southsea, Portsmouth.
 Hore, W. E., 92 Rock Avenue, Gillingham, Kent.
 Mitchell, G. E., 13 Hermitage Road, Finsbury Park, N.
107. { Penney, H., Cherrytree Orphanage, Totley, Sheffield.
 Robinson, R. H., 64 Park Road, Lightwoods, Birmingham.
 Swinbank, J., Council School, Low Bentham, Lancaster.
 Thompson, G., 3 Farm Road, Lillington, Leamington Spa.
 Wilkinson, H., 1 Mount Pleasant, Bradford-on-Avon.
 Williams, H. A., Litcham, Swaffham, Norfolk.
- { Baker, J., School House, East Clandon, Guildford.
 Bicheno, E., Council School, Sutton Valence, Maidstone.
118. { Evans, G. H., 26 Bath Road, Walsall.
 Steer, J. D., Lime Tree Cottage, Dunkirk, Faversham, Kent.
 Warner, P. C., Canterbury Villa, Cromwell Road, Caterham.
- { Haysman, J. H., Briarside, Meadow Way, Letchworth, Herts.
 Mockett, H., Victoria Avenue, Grappenhall, Warrington.
 Norton, B., Greville Cottage, Long Ashton, Bristol.
123. { Penhaul, S., Sea View, Gulval, Penzance.
 Swell, E. O., Lynwood, Willoughby Road, Langley, Bucks.
 Ulyett, C. E., Codsall, Wolverhampton.
 Wilkinson, W. D., 22 Glebe Road, Letchworth, Herts.
- { Bullock, H. M., Elm House, Blue Anchor, Fraddon, Cornwall.
 Canning, F. W., Gander Green Lane, Sutton, Surrey.
 Cranswick, J., 150 West View, Featherstone, Pontefract.
130. { Farmer, F. J., 13 Llewelyn Road, Leamington Spa.
 Mellor, J., County Technical School, Stafford.
 Moore, R. H., 60 Strone Road, Forest Gate, Essex.
 Paynter, F. T., Russell Street, Liskeard, Cornwall.
 Pickford, E., Fern Bank, Grange Road, Sale, Cheshire.

- Bradwell, H., Gladstone Terrace, Alton, Stoke-on-Trent.
 Colyer, H. W., Starnthwaite, Kendal, Westmorland.
 Dyson, A., Lowood Villas, Deepcar, Sheffield.
 Fiske, S. H., Hill House, Debenham, Stowmarket.
 Gibbs, F., School House, Clehonger, Hereford.
 138. Hannant, A. M., School House, Bradmore Green, Coulsdon.
 Henshall, F. B., 3 Albert Street, Crewe.
 Hunt, R., School House, Bleasdale, Garstang, Lancs.
 Roberts, D. H., School House, Llangynidr, Crickhowell.
 Sargent, O. A., Pensilva School, Liskeard, Cornwall.
 Sawdy, H. E., 86 Rosendale Road, W. Dulwich, S.E.
 Dybell, C., 2 Jubilee Terrace, Holton Road, Halesworth.
 149. Gates, H., School House, Cobham, Gravesend.
 Jones, D., Green Hill, Talog, Carmarthen.
 Jowett, A., Greenfield Villa, Gildersome, Leeds.
 Baker, A., Cranmere, Lime Grove, Addlestone, Surrey.
 Bretton, W., 56 Hope Street, Jordan Vale, Barnsley.
 Gardiner, F. T., Waverley, Worle, Weston-super-Mare.
 Lawrence, J. T., 1 Stamford Road, Amblecote, Brierley Hill.
 153. Middleton, W. H., 6 High Street, Bloxwich, Walsall.
 Orrett, E. J. P., Carrington House, Bath Street, Rugby.
 Owen, J., Garnedd Wen, Llanfair, Anglesey.
 Pinnock, A. R., 26 Claremont Road, Bishopston, Bristol.
 Sowerbutts, E., Liverpool Road, Cadishead, Manchester.
 Owen, T. G., The Schools, Milverton, Somerset.
 162. Perryman, F., Mayford School, Woking, Surrey.
 Rayson, W. D., 19 Bewlay Street, York.
 Rolfe, S. S. G., Edinburgh House, London Road, Bognor.
 166. Chapman, E., 7 Burr Bank, Wilmington, Dartford.
 167. Hill, W. G., Rosenborg, Wodeland Road, Guildford.
 Sterry, W. J., 3 Silfield Terrace, Tennyson Avenue, King's Lynn.
 Danson, H., Woodplumpton Catforth School, Preston.
 Hitchman, M., 65 Waller Road, New Cross, S.E.
 Kerridge, W. A. L., 8 Primrose Street, Victoria Road, Cambridge.
 169. Martin, B., Fenstanton, St. Ives, Hunts.
 Rogers, A. E., County Technical School, Stafford.
 Taylor, R. B., 37 Salop Road, Welshpool.
 Woods, J. E., School House, Byton, Presteign.
 Cook, E. C., Big Valley, Berry Brow, Huddersfield.
 Griffith, O., Hardwick Reformatory, Gloucester.
 176. Hudson, W. F., 51 Kingsley Street, Pleck, Walsall.
 Johnson, G. H., Eversleigh House, Brooke, Norwich.
 Pym, D. H., School House, Bath Road, Hounslow.
 Smith, M., Poplar Cottage, Boulge, Woodbridge.
 Chaplin, E., School House, Bramfield, Halesworth.
 Downes, J. K., School House, Wookey, Somerset.
 182. Earp, D., 14 Clyde Street, Old Hill, Staffs.
 Martin, E., Hill View, Whyteleafe, Surrey.
 Wicks, J. D., 298B Foleshill Road, Coventry.

NOTES ON RECENT RESEARCH
AND
SHORT ABSTRACTS FROM CURRENT PERIODICAL
LITERATURE, BRITISH AND FOREIGN,
AFFECTING
HORTICULTURE & HORTICULTURAL SCIENCE.

JUDGING by the number of appreciative letters received, the endeavour commenced in volume xxvi. to enlarge the usefulness of the Society's Journal, by giving an abstract of current Horticultural periodical literature, has met with success. It has certainly entailed vastly more labour than was anticipated, and should therefore make the Fellows' thanks to those who have helped in the work all the more hearty.

There are still, we feel, some departments of Horticulture and Horticultural Science very imperfectly represented in these abstracts, and the Editor would be grateful if any who have time at command, and who are willing to help in any special direction in this work, would communicate with him. He desires to express his most grateful thanks to all who co-operate in the work, and he ventures to express the hope that they will all strictly adhere to the general order and scheme of working, as the observance of an identical *order* can alone enable the Editor to continue to cope with the work. The order agreed on is as follows :—

1. To place first the name of the plant, disease, pest, &c., being noticed ; and in this, the prominent governing or index word should always have precedence.

2. To place next the name, when given, of the author of the original article.

3. Then, the abbreviated form of the name of the journal, &c., in which the original article appears, taking care to use the abbreviation which will be found on pp. 281, 282.

4. After this, a reference to the number, date, and page of the journal in question.

5. If an illustration be given, to note the fact next, as "fig.," "tab.," or "plate."

6. After these preliminary necessities for making reference to the original possible for the reader, the abstract or digest should follow, ending up with the initials of the contributor affixed at the close of each Abstract or Note.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP
IN THIS WORK.

Baker, F. J., A.R.C.S., F.R.H.S.
 Ballard, E., F.R.H.S.
 Beer, R., B.Sc., F.L.S., F.R.H.S.
 Boulger, Professor G. S., F.L.S., F.R.H.S.
 Bowles, E. A., M.A., F.L.S., F.E.S., F.R.H.S.
 Bunyard, E. A., F.R.H.S.
 Cayley, D. M.
 Chapman, H., F.R.H.S.
 Chittenden, F. J., F.L.S., F.R.H.S.
 Cooke, M. C., M.A., LL.D., A.L.S., F.R.H.S., V.M.H.
 Cotton, A. D., F.L.S.
 Darlington, H. R., F.R.H.S.
 Druery, C. T., V.M.H., F.L.S., F.R.H.S.
 Dykes, W. R., M.A., F.R.H.S.
 Farmer, Professor J. B., M.A., D.Sc., F.R.H.S.
 Groom, Professor Percy, M.A., D.Sc., F.L.S., F.R.H.S.
 Hartog, Professor Marcus, D.Sc., M.A., F.L.S., F.R.H.S.
 Henslow, Rev. Professor Geo., M.A., F.L.S., F.R.H.S., V.M.H.
 Hodgson, M. L., F.R.H.S.
 Hooper, Cecil H., M.R.A.C., F.R.H.S.
 Horne, A. S., B.Sc., F.G.S., F.R.H.S.
 Houston, D., F.L.S., F.R.H.S.
 Jeffery, Violet G., F.R.H.S.
 Kent, A. H., A.L.S., F.R.H.S.
 Kerridge, Rev. A. A., M.A., F.R.H.S.
 Long, C. H., F.R.H.S.
 Massee, Geo., F.L.S., F.R.H.S., V.M.H.
 Newstead, R., A.L.S., F.E.S., F.R.H.S.
 Pethybridge, G. H., B.Sc., Ph.D., F.R.H.S.
 Petts, Alger, F.R.H.S.
 Rendle, A. B., M.A., D.Sc., F.L.S., F.R.S., F.R.H.S.
 Reuthe, G., F.R.H.S.
 Scott-Elliot, G. F., M.A., B.Sc., F.L.S., F.R.H.S. F.R.G.S.
 Smith, William G., B.Sc., Ph.D., F.R.H.S.
 Swire, W., F.R.H.S.
 Veitch, Harry J., F.L.S., F.Z.S., F.R.H.S.
 Voss, W. A., F.C.S., F.R.H.S.
 Webster, A. D., F.R.H.S.
 Welby, F. A., F.R.H.S.
 Williams, S. E., F.R.H.S.
 Wilson, Gurney, F.L.S., F.R.H.S.

JOURNALS, BULLETINS, AND REPORTS

from which Abstracts are made, with the abbreviations used
for their titles.

Journals, &c.	Abbreviated title.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
Annales Agronomiques	Ann. Ag.
Annales de la Soc. d'Hort. et d'Hist. Naturelle de l'Hérault	Ann. Soc. Hé.
Annales de la Soc. Nantaise des Amis de l'Hort.	Ann. Soc. Nant. des Amis Hort.
Annales des Sciences Naturelles	Ann. Sc. Nat.
Annales du Jard. Bot. de Buitenzorg	Ann. Jard. Bot. Buit.
Annals of Botany	Ann. Bot.
Beiheft zum Botanischen Centralblatt	Beih. Bot. Cent.
Boletim da Real Sociedade Nacional de Horticultura	Bol. R. Soc. Nac. Hort.
Boletim da Sociedade Broteriana	Bol. Soc. Brot.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Bulletin de la Société Botanique de France	Bull. Soc. Bot. Fr.
Bulletin de la Soc. Hort. de Loiret	Bull. Soc. Hort. Loiret.
Bulletin de la Soc. Mycologique de France	Bull. Soc. Myc. Fr.
Bulletin Department of Agricult. Brisbane	Bull. Dep. Agr. Bris.
Bulletin Department of Agricult. Melbourne	Bull. Dep. Agr. Melb.
Bulletin of the Botanical Department, Jamaica	Bull. Bot. Dep. Jam.
Bulletin of Bot. Dep. Trinidad	Bull. Bot. Dep. Trin.
Bulletino della R. Società Toscana d'Orticoltura	Bull. R. Soc. Tosc. Ort.
Canadian Reports, Guelph and Ontario Stations	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chronique Orchidéeenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Contributions from U.S.A. Herbarium	Contr. fr. U.S.A. Herb.
Department of Agriculture, Victoria	Dep. Agr. Vict.
Department of Agriculture Reports, New Zealand	Dep. Agr. N.Z.
Dictionnaire Iconographique des Orchidées	Dict. Icon. Orch.
Die Gartenwelt	Die Gart.
Engler's Botanische Jahrbücher	Eng. Bot. Jah.
Gardeners' Chronicle	Gard. Chron.
Gardeners' Magazine	Gard. Mag.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agricult. Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies	Jour. Imp. Dep. Agr. W.I.
Journal of Agricultural Science	Jour. Agr. Sci.
Journal of Botany	Jour. Bot.
Journal of Chemical Society	Jour. Chem. Soc.
Journal of Economic Biology	Jour. Econ. Biol.
Journal of Economic Entomology	Jour. Econ. Entom.
Journal of Genetics	Jour. Gen.
Journal of Horticulture	Jour. Hort.
Journal of the Board of Agriculture	Jour. Bd. Agr.
Journal of the Linnean Society	Jour. Linn. Soc.
Journal of the Royal Agricultural Society	Jour. R.A.S.
Journal S.E. Agricultural College, Wye	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte	Kais. Ges.
La Pomologie Française	Pom. Franç.
Le Jardin	Le Jard.
Lebensgeschichte der Blütenpflanzen Mitteleuropas	Lebens. d. Blütenpf.
Mendel Journal	Mendel Jour.
Naturwiss. Zeitschrift Land und Forst	Nat. Zeit. Land-Forst.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin	Not. König. Bot. Berlin.
Oesterreichische Garten-Zeitung	Oester. Gart. Zeit.

Journals, &c.	Abbreviated title.
Orchid Review	Orch. Rev.
Orchis	Orchis.
Phytopathology	Phytopathology.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Quarterly Journal of Forestry	Quart. Jour. of Forestry.
Queensland Agricultural Journal	Qu. Agr. Journ.
Reports of the Missouri Botanical Garden	Rep. Miss. Bot. Gard.
Revue de l'Horticulture Belge	Rev. Hort. Belge.
Revue générale de Botanique	Rev. gén. Bot.
Revue Horticole	Rev. Hort.
The Garden	Garden.
Transactions Bot. Soc. Edinburgh	Trans. Bot. Soc. Edin.
Transactions of the British Mycological Soc.	Trans. Brit. Myc. Soc.
Transactions of the Massachusetts Hort. Soc.	Trans. Mass. Hort. Soc.
U.S.A. Department of Agriculture, Bulletins	U.S.A. Dep. Agr.*
U.S.A. Experimental Station Reports	U.S.A. Exp. Stn.†
U.S.A. Horticultural Societies' publications	U.S.A. Hort. Soc.†
U.S.A. State Boards of Agriculture and Horticulture	U.S.A. St. Bd.†
Woburn Experiment Farm Report	Woburn.

* The divisions in which the U.S.A. Government publish Bulletins will be added when necessary.

† The name of the Station or State will in each case be added in full or in its abbreviated form.

NOTES AND ABSTRACTS.

Agricultural Conference in Antigua, 1910 (*West Indian Bull.* vol. x. p. 233. 1910).—This is the Report of the visit of a number of Barbados sugar planters to Antigua for the purpose of inspecting newly introduced methods of sugar cane cultivation by means of implements, and sugar works fitted with steam-heated pans for making muscovado sugar.

Among the resolutions passed were the following :

(1) " That in the opinion of this meeting, the concessions granted to the Canadian refiners whereby they are empowered to import, on preferential terms from non-preferential countries, sugar equal to one-fifth of the imports, nullify the benefit of the preferential treatment to the British West Indies: and it is therefore desirable that the Royal Commission should be urged to make strong representations directed towards the repeal of this breach of preferential arrangements."

(2) " That the prices paid in Canada for muscovado sugar from the British West Indies are below the world's parity of prices and show no evidence of preferential treatment."

The following subjects were discussed unofficially by the members of the Conference and form the subject of separate papers in the Report :

- (1) Five years' working of the Antigua Sugar Factory.
- (2) Muscovado Sugar-making by Steam Boiling.
- (3) Implemental Cultivation.
- (4) Systems of Agricultural Education.
- (5) The Introduction of Insectivorous Birds.—*C. H. L.*

Alectorurus yedoensis (*Bot. Mag.* tab. 8336).—*Nat. ord. Liliaceae*; tribe *Asphodeleae*. Japan. Herb, perennial; leaves 6-11, tufted, ensiform; scape 10-30 inches long; flowers set racemously; perianth, campanulate, pale-rose; stamens exserted.—*G. H.*

Alfalfa Disease, A new Stem Blight. By Walter G. Sackett (*U.S.A. Exp. Stn., Colorado, Bull.* 159; April 1910).—The stem blight of Alfalfa is due to a rod-shaped mobile bacterium, *Pseudomonas medicaginis*. The blight makes its appearance in the first half of May, and if the attack is bad the first stand shrivels and dies about six weeks before the first cutting.

The disease is primarily a stem infection, but leaves may show the characteristic watery looking areas independent of the stem. In bad cases the roots also are affected. The stem has a watery semi-transparent appearance in the early stages, is yellow, olive green in colour, and excretes a viscid liquid which soon dries, forming a shiny,

varnished-looking layer on the stem. After this the stems become black in six to eight weeks.

The bacteria are present in the soil, and infection may take place either through the stomata, or through cracks caused by frosts or cold. The disease seems to run its course in the first cutting, and is not seen again till the following year.

The writer recommends growing immune varieties, and when the disease is prevalent, the early cutting away of frost-injured stems, when all danger of frost is over. By this means the regular number of cuttings should be secured with little or no loss.—*D. M. C.*

Almond Shoots appearing on a Peach Tree. By M. G. Boucher (*Journ. Soc. Nat. Hort. Fr.*; Ser. 4; vol. xi. p. 513; August 1910).—The fact is stated that on several grafted peach trees more than eighty years old some shoots of almond have just appeared. The trees are in the garden of M. Formont at Montreuil-sous-Bois, and he began to notice the phenomenon two years ago when the first of these almond shoots appeared on a peach tree fifteen years old about three metres above the graft.

This year's shoots are on peach trees of the old variety Mignonne which have made very little flowering wood this year and have borne no fruit, as indeed has been the case with most trees this season. A committee was appointed to inspect the trees, but has so far no theory to account for their behaviour. Certain facts are, however, recorded which may bear upon the subject. The roots of one of the stocks were recognized as those of an almond. It is possible that the peach was a hybrid of the almond and this is a case of a return to the ancestral type, to support which theory we have the almond-peach (*A. persicoides* DC) from the old *Persica Davidiana*.—*M. L. H.*

Apples, Three Snout Beetles that attack. By F. E. Brooks (*U.S.A. Exp. Stn., W. Va., Bull.* 126; January, 1910; 4 plates.).—The plum curculio (*Conotrachelus nenuphar* Hbst.), apple curculio (*Anthonomus quadrigibbus* Say.), and the apple weevil (*Pseudanthrenus crataegi* Walsh) are the three beetles described in this bulletin, all of which do much damage to the apple crop in many parts of Virginia by puncturing the fruit for the purposes of feeding and egg-laying.

Spraying with arsenate of lead or Paris green and jarring the insects from the trees on to white cloths placed below, are among the remedies suggested.—*V. G. J.*

Ambulia sessiflora. By H. Baum (*Die Garten*, p. 657, Dec. 17, 1910).—A very pretty aquatic for greenhouse or aquaria. It grows easily and quickly, and is also easily propagated by seeds or cuttings, as well as by division. Its native habitat is in India, in ditches for the irrigation of the ricefields. It has pretty white flowers.

Ottelia alismoides is another aquatic from India, resembling at first sight a Sagittaria, and has long lanceolate leaves; later, however, when fully grown, the leaves are large and cordate. The flowers of this

remarkable plant are white with yellow centre, rather pretty, but they only last a day. *Ottelias* can only be increased by seeds, and this is rather difficult, as only about 8 per cent. seedlings survived.

Aponogeton Dinteri, from South Africa, was first known under the name of *A. flavum*. Since it flowered and was found to be a new plant it was named after its discoverer. It resembles the common *A. distachyon*, but has yellow flowers. Being less prolific than *A. distachyon* and more difficult to manage, this species is still very rare.

Echinodorus grandiflorus, another grand aquatic from South America. It has large handsome leaves and panicles of white flowers. It easily ripens seeds, which can be preserved dry, and when sown in the spring they germinate quickly and surely.—*G. R.*

Ammonia in Soils. By Dr. E. J. Russell (*Jour. Agr. Sci.* iii. pt. 3, pp. 233-245, Sept. 1910).—The author discusses methods of estimating ammonia in soils, and gives two based upon his observations. The amount of ammonia in the soil is very small (about one or two parts in the million of soil, rising to five or six in heavily dunged or garden soils), and remains fairly constant throughout the year. There is no tendency for ammonia to accumulate, since the rate of nitrification is greater than that of ammonia production.—*F. J. C.*

Apple Orchards. The Fertilization of. By J. P. Stewart (*U.S.A. Exp. Stn., Pennsylvania, Bull.* 100; June, 1910; 9 figs).—Fertilizers are but one of many factors that affect success in orcharding, and their application may be wholly without effect in the presence of weaker factors which are exercising a greater influence than the deficiency of plant food in limiting the crops. When all other factors are apparently right the need of fertilizers may be indicated by the trees being deficient in growth, foliage, or fruit. In the experiments described in this bulletin nitrogen has greatly increased the quantity of fruit, and the author thinks that many failures with potash and phosphate have been due to a deficient nitrogen supply. It needs using cautiously, however, as it lessens the colour of the fruit and sometimes its size also. Diminished colour following an excess of nitrogen is associated with delayed maturity and diminished light supply to the fruit owing to the increased density of the foliage (p. 14). It has been found that apples exposed to sunlight after gathering developed increased redness by over 35 per cent., while those kept in the dark showed practically no increase. None of the fertilizers applied has shown any consistent ability to improve the colour or the size of the fruit, the latter being held to depend upon the amount of moisture available. As regards crops some very striking results are shown, increased yields valued at £30 to £50 per acre having been obtained as the result of manuring apple trees, presumably in cases where plant food had previously been the crop limiter in those orchards (p. 16). The results of the experiments lead the author to make a general recommendation of the use of

fertilizers which will supply nitrogen, phosphate, and potash at the rates of about 30, 65, and 50 pounds to the acre respectively (p. 26). The question of cover crops versus tillage is also discussed, and its bearing upon systems of manuring (pp. 21 and 22).—A. P.

Arsenical Compounds upon Apple Trees, A Preliminary Report on the Effects of. By D. B. Swingle and H. E. Morris (*Phytopathology*, vol. i. pt. 3, pp. 79-93; June 1911).—It has been reported by some observers that arsenical compounds damage fruit trees when used as sprays, while others have denied that any such damage was done. A considerable series of experiments was arranged by the authors, who conclude that

1. Serious injury to apple trees may, under certain conditions, result from application of the so-called "insoluble" arsenical insecticides.

2. Among the conditions that favour this injury, recently made wounds through the outer bark are highly important.

3. Functional lenticels and dormant buds also permit the absorption of arsenical compounds in solution.

4. The corky bark is highly protective and does not readily become disintegrated by the action of arsenical compounds.

5. It is not safe to cut off water sprouts from the bases of trees in early spring and permit the arsenical washes now in use to accumulate about the unprotected wounds the same season.

6. White lead paint applied to these wounds will practically protect them even if put on just before the arsenicals are applied.

7. The most noticeable symptoms of rapid arsenical injury through the bark is discoloration of bark and outer wood, often following definite lines up and down the stem, and a dull spotting of the leaves followed by wilting, shrivelling, and drying.

8. It is not improbable that the injury is due more to soluble impurities than to the slight solubility of the compounds themselves.

9. If this is the case the remedy for the alleged arsenical injury lies, not in discontinuing the use of arsenical insecticides, but in securing grades of higher purity.

10. Arsenic trisulphide does not promise to be more safe when applied to the bodies of trees than the arsenical insecticides now in common use.

11. Zinc arsenite gave practically no injury under the most severe conditions of the tests.—F. J. C.

Alcohol from Tunas and other Sources, Denatured. By Messrs. Hare, Mitchell and Bjerregaard (*U.S.A. Exp. Stn., New Mexico, Bull.* 72, 1909).—Alcohol being much used, when denatured, for industrial purposes, many plants and farm products have been utilized as its source, amongst others the Tuna, or Prickly Pear.

The word alcohol, as used here, means *Ethyl*, ordinary or grain alcohol, sometimes called spirits of wine. It is produced by

the fermentation of sugar or starch, and is used as a heating medium, as a solvent for resins and oils, in the manufacture of smokeless powder, ether and chloroform, in the preparation of aniline colours, &c. Methyl, or wood alcohol, CH_4O , is produced by distillation of wood, and though similar in some respects to ethyl, is poisonous and unpalatable, and is the principal denaturant of ethyl alcohol, its addition preventing the use of the latter as a beverage, while not interfering with its industrial value.

Alcohol is cleaner and more convenient in use than other liquid fuels, but has only three-fifths of their heating power. It might be produced profitably by the farmer judging by the comparative value of corn fed to stock and the same corn fermented, were it not for the cost of installing the plant necessary to produce alcohol strong enough to denature (90 per cent.). It might be rendered possible by allowing farmers to produce 100 per cent. proof alcohol in cheap fire pot stills, to be shipped under bond to a central depot for denaturing. The season of the Tuna fruit is short, only sixty days, and would require to be lengthened with other materials.

Some of the advantages of alcohol over kerosene and gasoline are :

- (1) Cleaner and safer in use.
- (2) Flame more readily extinguished by water, which does not spread alcohol, but mixes with and dilutes it.
- (3) Less heat given off both in lighting and heating (good in hot weather).
- (4) Consumes less air than kerosene in confined space.

There are some disadvantages :

- (1) Costs more.
- (2) Heating value only 70 per cent. of other fuels.
- (3) Mantles are necessary and have to be replaced.
- (4) Utensils require preliminary heating before use.

The main sources of alcohol production are : some farm crops, some fruits, and sawdust. In the States corn and molasses are chiefly used. Germany has evolved a type of potato producing a large yield from the acre with a high starch content for this purpose, while France depends upon the sugar-beet. Germany produces 100,000 gallons per annum.

To use the Tuna profitably large yields of the fruit must be obtained from small areas. A yield of 10 tons from the acre, sold at 15 cents per 100 lb., would bring \$30, which seems a good return for worthless land and little cultivation, but gathering the fruits, as at present, by hand, prevents the operation being profitable.—C. H. L.

Bees and Pollination of Fruit Blossom (*Gard. Mag.*, No. 2980, December 10, 1910, pp. 970).—Investigations were made at Oregon Agricultural College into the question of self-sterility of apples and the part played by wind and bees. Small glass slides smeared with vaseline were suspended in various positions when the trees were in full bloom, and the wind-borne pollen grains caught after twenty-four hours

counted. They were so very few that it would seem the wind cannot be relied upon to transfer the pollen, and to confirm this the blossoms of a whole tree were emasculated and the petals were also removed. During the whole time that the pistils were receptive only eight bees visited the tree, while twice that number were seen in half an hour to visit a tree in full bloom twenty feet away. Of 1500 blooms emasculated only five set fruit.—*E. B.*

Bees in an Orchard House. By R. Lamlinet (*Jour. Soc. Nat. Hort. Fr.*; Ser. 4; vol. xi.; August 1910; p. 532).—A hive of bees was brought into an orchard house as soon as the fruit trees began to bloom. The warmth of the house soon brought out the bees, and eventually their activities were quite effectual in fertilizing the pears, apples, cherries, gooseberries, and above all the plums in the house. For some reason they disliked, and after a first taste quite avoided, the peach bloom. The reason for this dislike is to be made the subject of future investigation. The hive must be the subject of extra care, as it will leave the house weakened by the loss of probably all the workers who found their way outside during the ventilation of the house, and it must be carried outside again in fine warm weather so that the bees may not suffer from the sudden change of temperature.—*M. L. H.*

Beets, The Curly-Top of. By H. B. Shaw (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 181; July 1910).—The name of curly-top of beet practically describes the symptoms. The author considers the disease to be primarily due to the attacks of the beet leaf hopper, *Eutettix tenella*. The veins and leaves become distorted, excrescences form on the veins, the petioles remain short, and there is an abnormal growth of small imperfectly formed leaves. The foliage is dark, dull green, quite brittle, and leathery in texture. In some cases the outer leaves turn yellow, then the inner whorls in succession until the whole plant dies. The root throws out dense masses of rootlets, and itself becomes tough and leathery. The fibro-vascular bundles become darkened throughout the entire length of the root.

Various other theories have been put forward to account for curly-top such as bacteria, fungi, bad cultural conditions, the weather, &c., and there seems to be no doubt that any check in the growth of the beet in the early stages renders the plant less resistant to the attack of *Eutettix tenella*, and weather may also influence the severity of the attack. The softening and decay of the tissues of the root, which so often go with attacks of curly-top, the author considers to be directly due to the fungus *Phoma betae*, and not to the leaf-hopper.

Curly-top is a serious menace to the production of beet seed and the culture of beet for sugar in the United States. It is useless to store roots of badly attacked beets for growing a second year for seed. They are either unable to develop any seed stem at all, or else they have only sufficient vitality left to reach the flowering stage (although badly stunted and distorted) and will set a small quantity of seed. No variety is immune.

There are other host plants besides the beet, but the attack takes the form of spots only on the leaves. No typical curly-top symptoms have been noted in these host plants except in the case of cabbage observed in 1909. The beet-hoppers are said to migrate from weeds on to the beets when they appear in May and June.

A description of *Eutettix teneilla* is given. It is a small insect, often mistaken for white fly (*Aleyrodes citri*) one-eighth of an inch long, of a yellowish-green tinge, looking white at a distance. It feeds both in the larval and adult stage, the larval attack being the more severe.

The disease cannot be due to the loss of plant juices only, but rather to the introduction by the insect of some more active agent into the tissues of the plant.

Several remedies are recommended:—

(1) Spraying with kerosene emulsion.

(2) Rolling, if the insects appear when the beet-crop is quite young, especially in dull damp weather when the insects are sluggish.

(3) Early sowing, and healthy cultural conditions.

(4) Dragging tarred boards in between the rows with some sort of drag in front to agitate the leaves to make the insects hop.—D. M. C.

Begonia Lucerna. By G. T. Grignan (*Rev. Hort.* August 16, 1910, pp. 380-1; coloured plate).—The plate represents a very handsome floriferous form, with panicles of from fifty to eighty rich rose red and light pink flowers springing from dark green, spotted foliage, with red under-surface. It is described as a perpetual bloomer, capable of resistance to dry air for several weeks, and hence particularly adapted for temporary indoor decoration.—C. T. D.

Betula Maximowiczii (*Bot. Mag.* tab. 8337).—Nat. ord. *Cupuliferae*; tribe *Betulaceae*. Japan, Saghalien, and Manchuria. Tree, sometimes reaching 100 feet in height; leaves broadly ovate, 3-6 inches long and $3\frac{1}{2}$ inches wide, deeply cordate, serrate. Male catkins fascicled, 3-4 $\frac{1}{2}$ inches long; female, 2-4 loose racemes, 1 $\frac{1}{4}$ inch long.
G. H.

Bordeaux Mixture, Copper in Tea sprayed with. By H. E. Annett and S. Chundra Kar (*Jour. Agr. Sci.* iii. pt. 3, pp. 314-316, Sept. 1910).—Bordeaux mixture having been used for spraying tea attacked by the fungus *Exobasidium verans*, it was thought desirable to ascertain how much copper was present on the sprayed leaves. The leaves were picked nine days after the spraying and analysed, when it was found that the sprayed leaves contained $\frac{1}{2}$ grain of copper per lb., the unsprayed $\frac{1}{12}$ grain. The method of analysis is given. Thus tea normally contains copper, as do many other plants, cocoa being one with a high content ('09 to '22 grain per lb.). The quantity of copper taken in tea which had been sprayed with Bordeaux mixture would thus be almost inappreciably small (about '0002 grain contained in eight teaspoonfuls).—F. J. C.

Cacao Pod Disease, New West Indian. By C. K. Bancroft (*West Indian Bull.* vol. xi. No. 1, p. 34, 1910).—A new fungus, in addition to the five species already known (*Colletotrichum Cradwickii*) has been observed on pods received at Kew, but owing to lack of suitable material for infection its parasitism has yet to be investigated.

C. H. L.

Cacaos at the Dominica Botanic Station, Notes on some. By Joseph Jones (*West Indian Bull.* vol. x. No. 4, p. 337; 1910).—Refer more especially to the Alligator Cacao (*Theobroma pentagona*) and the Tiger Cacao (*Theobroma bicolor*) both of which names are deprecated for trade use. To test their commercial value, samples of each were sent to Messrs. Fry, Rowntree, and Cadbury.

In the first case, the peculiar flavour is noticed. It is not considered equal to the finest Caracas Cacao, although colour and appearance are good. The second variety was found to be of no value from a cacao or chocolate manufacturers point of view.—C. H. L.

Caterpillar, The New Mexico Range (*Hemileuca olivia* (Kll.)). By C. N. Ainslie (*U.S.A. Dep. Agr. Bur. Entom., Bull.* 85, Part V.; June 15, 1910; 3 plates, 22 figs.).—The area at present affected by this pest extends from Les Vegas, N. Mex., on the South to Las Animas, Colo., on the north, and from Cimarron and Kochler, N. Mex. on the west, to points within the Texas "Panhandle" on the east; roughly, 200 miles from north to south, by 150 miles east to west. The caterpillars feed on the grama and buffalo grasses, and in places not only has the grass been eaten to the very roots for miles at a stretch, but the uneaten grass is made objectionable to cattle on account of the trail of silk left by the caterpillars, especially when moulting.—V. G. J.

Chirita rupestris (*Bol. Mag.* tab. 8333).—Nat. ord. *Gesneraceae*; tribe *Cyrtandraceae*. Malay Peninsula. Herb, 1-2 feet high; leaves 2-3 inches long; corolla funnel-shaped, limb, bright blue with a yellow blotch within.—G. H.

Chlorosis, Sulphate of Iron for. By M. Cofigniez (*Jour. Soc. Nat. Hort. Fr.*; Ser. 4; vol. xi. p. 554; September 1910).—The treatment of trees affected with chlorosis by injections of iron sulphate is here again recommended, and cases are cited where it has been entirely successful. In certain subjects it was found necessary to treat each branch separately, the usual plan of injection into the trunk of the tree not being effectual alone.—M. L. H.

Chrysanthemums against a Wall. By M. Andol (*Jour. Soc. Nat. Hort. Fr.*; Ser. 4; vol. xi. p. 565; September 1910).—An account taken from *Le Moniteur d'Horticulture* of a method of growing chrysanthemums suited to those who have no glass-house to receive them. About the end of September the chrysanthemums were carefully lifted

with a ball of earth and planted in two rows along a wall facing south, from which the fruit had already been gathered. Tall plants were placed at the back almost touching the wall and dwarf ones in front, the stems of all being so arranged and interlaced against supports that in the blooming season the whole face of the wall was covered with a glowing mass of colour. Seen from the side with the sun full upon the wall the effect is said to have been dazzling. Screens of cloth or straw must of course be provided to protect the plants from frost and excessive wet.—*M. L. H.*

Chrysanthemums, Box for Packing. By *M. H. Crépin* (*Jour. Soc. Nat. Hort. Fr.*; Ser. 4; vol. xi. p. 654; October 1910).—A useful contrivance is described for packing chrysanthemums to send by post in such a way that the blooms shall not be injured.—*M. L. H.*

Chrysanthemums, Manure for. By *M. Decaux* (*Jour. Soc. Nat. Hort. Fr.*; Ser. 4; vol. xi. p. 633; October 1910).—A description of the results arrived at in growing chrysanthemums in the open in soils containing different sorts of manure. The four natural soils in which the tests were carried out contained

Nitrogen	2.81	} per kilogramme of earth.
Potash	0.43	
Phosphoric Acid . .	1.22	
Chalk	11.50	

The test rows were five in number:—

1. Without any added manure.
2. With a complete manure, 25 grammes dried blood, 25 grammes burnt horn, and 100 grammes powdered bone to the square metre. Applied as a top-dressing, one dose at half-strength being applied on August 10.
3. Without nitrogen, 50 grammes sulphate of potash and 100 grammes powdered bone per square metre. Applied as above.
4. Without potash, 25 grammes dried blood, 25 grammes horn, and 100 grammes powdered bone per square metre. Applied as above.
5. Without phosphoric acid, 25 grammes dried blood, 25 grammes horn, and 50 grammes sulphate of potash per square metre. Applied as above.

Of the above the third row produced the best results in every way, and the fourth was the worst.

The writer concludes from all the experiments that nitrogen is absolutely harmful in a soil already containing 2.81 per kilogramme, and that potash and phosphoric acid are indispensable. He strongly deprecates the use of liquid manure during the growing season, greatly preferring an early top-dressing to be given not later than August 15.

M. L. H.

Chrysanthemums, History of. By *Ferdinand Conillard* (*Jour. Soc. Nat. Hort. Fr.*; Ser. 4; vol. xi. p. 636; October 1910).—An

interesting article on the garden Chrysanthemum, giving a history of the plant, an account of its origin as far as that is known, and a chapter on the classification of varieties according to:

- (1) presumed origin;
- (2) aptitudes and habit;
- (3) form of the flowers.

M. Conillard considers that none of the existing systems of classification are really satisfactory. It is by no means certain that there were distinctive Chinese, Japanese, or Indian forms; and again, what is the mathematical difference in size between a large-flowered and a small-flowered Chrysanthemum? what is the exact moment of time which separates an early from a late flowering variety? or what, amid the marked changes which our modern methods of cultivation make in colour, appearance, and date of flowering would be the exact scientific formula which should define a decorative Chrysanthemum? He suggests that the perfect system of classification of the future will be based upon a study of the form of the ray florets and semi-florets which give the flower its distinctive appearance.—*M. L. H.*

Codling Moth, New Sprays for the. By C. P. Gillette (*Jour. Econ. Entom.* iii. pt. 1, pp. 29-32; February 1910).—Sulphide of arsenic was used in comparison with lead arsenate. It was made by precipitation of arsenic with hydrogen sulphide. The washed precipitate was dissolved in lime sulphur solution of the usual strength. The idea in using this instead of lead arsenate is that it is not soluble in water and is therefore not likely to produce the alleged arsenical poisoning of fruit trees. Good results were obtained against codling moth, for while the control trees gave only 58.9 per cent. of sound apples the sprayed trees gave 93.6 per cent. Nicotine preparations protected the trees to some extent, but were less efficient than the arsenical compounds.—*F. J. G.*

Codling Moth, Spraying for the. By W. E. Rumsey (*U.S.A. Exp. Stn., W. Va., Dep. Entom., Bull.* 127; March 1910; 2 plates, 4 tables, and diagrams).—Entomologists in the Eastern States use a fine mist-like spray with a medium amount of pressure, applied two to four times during the season, the first spraying just after the petals fall. Their Western colleagues think that a coarse high-pressure spray applied once at the right time (just after the petals fall) will give as good, if not better, results as three or four mist-sprays, their reason being that with the high-pressure spray the poison is forced into the calyx cup of the forming apple, where it remains ready to be eaten by the young worm when it begins to mine into the apple through the calyx end; while with a mist spray no poison is put into this cavity, but is left within the surface of the outer calyx cup, and thus is less likely to be eaten by the worm.

This is a preliminary report comparing Eastern and Western methods, and so far as the investigations have proceeded there is little to choose between the two.—*V. G. J.*

Coffee-bean Weevil, Additional Notes upon the Breeding of the. By E. S. Tucker (*Jour. Econ. Entom.* vol. 2, pt. 6, pp. 373-381. December 1909).—This weevil (*Araecerus fasciculatus* De Geer) has been previously recorded attacking the green stems of maize (see *Jour. R.H.S.*, vol. xxxvi. p. 774). It attacks a number of different plants, including the cotton, breeding in the bolls. Some additional notes on its habits are given and a bibliography.—*F. J. C.*

Cold Resistance of Alfalfa and some Factors Influencing it. By C. J. Brand and L. R. Waldron (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 185; September 1910; plates).—The results of a long series of trials of hardiness are reported and it is concluded that lucerne (Alfalfa) "appears to be quite as diverse physiologically as it is botanically, and in the majority of cases botanical or morphological lines of descent seem to have no correlation with the physiological."

It is thought that several different causes may contribute to the hardiness of different strains, e.g. "in some it may be due to the faculty of becoming dormant at the proper time, in others to the habit of growing from deep-seated crowns, in still others to the power of re-establishing a root system quickly when heaving or freezing has broken off the root."

By varying the time of cutting so as to leave considerable growth on the field in the autumn, even the strains of inferior hardiness endured though the conditions were severe.

The authors suggest that seed should be saved from individuals that pass through severe winters unharmed and that this system should be maintained. They bring but little evidence to show that it would be successful.—*F. J. C.*

Colours, Handy Notebook of. By M. Chantrier (*Jour. Soc. Nat. Hort. Fr.*; Ser. 4; vol xi. p. 629; October 1910).—A description of a handy guide for identifying shades of colour, which may be carried in the pocket for outdoor work and used in connexion with the more cumbersome colour-chart now in existence. It was the invention of the author.—*M. L. H.*

Columnnea Oerstediana (*Bot. Mag.* tab. 8344).—Nat. ord. *Gesneriaceae*; tribe *Cyrtandreae*. Costa Rica. Epiphytic herb, or under-shrub; leaves opposite, 5-8 lines long; flowers axillary, solitary, erect; corolla pink, 3 lines long; stamens 4, exserted.—*G. H.*

Coniferae, Remarks on the Oecology of. By Percy Groom (*Ann. Bot.* vol. xxiv. April 1910, pp. 241-268).—The following problems concerning the north temperate Coniferae are discussed: (1) the cause of their xerophytic foliage and tracheidal wood, (2) the cause of their survival in competition with dicotyledonous trees, and (3) the cause of the suppression of many forms in past ages. The author summarizes his results much as follows: The northern evergreen Coniferae are architectural xerophytes in which the extensive

surface exposed by the evergreen leaves as a whole renders it necessary for the individual leaves to be xeromorphic in form and xerophytic in structure. This type of structure enables these Coniferae to live in regions where there is a season of physiological drought, in situations varying from dry dunes to moist forests, and from Arctic and Alpine situations to the Tropics.

The tracheidal structure of the wood is well suited to the xerophytic evergreen leaves. It is not a bar to progress and to the adoption of the deciduous habit, for in the larch a rapid transpiration current flows through it and the leaves transpire rapidly. The tracheidal structure of the wood more probably provides the conifer with a safety mechanism that is a defence against extinction.

With regard to the third problem the author considers that conifers are more easily deranged and killed by sudden injuries, and are attacked by a larger number of serious fungus and insect foes than are dicotyledonous trees. To their greater vulnerability and smaller powers of repairing injuries we may at least partially attribute the defeat and extinction of many conifers in past ages.—A. D. C.

Coniothyrium Fuckelii, Parasitism of. By P. J. O'Gara. (*Phytopathology* i. pt. 3, pp. 100-102; June 1911; plates).—This fungus is recorded damaging apple twigs and young apple trees, producing canker spots, the surface of which showed numerous minute pycnidia. It was also found on rose and cross inoculations were carried out. A rot is produced by the fungus on apple fruits, first a circular brownish and somewhat sunken area being produced, smooth at first but later becoming wrinkled. Infection usually occurs where the bark has been bruised or slightly broken by tools or harness in cultivating. (See *Journal R.H.S.* xxxiv. p. 222.)—F. J. C.

Contests for Boys and Girls, Industrial. By G. J. Christie and Henrietta W. Calvin (*U.S.A. Agr. Exp. Stn., Purdue, Circ.* 19, November 1909; plates).—Hints on the promotion and organization of the industrial contests which are now becoming a recognized method of furthering the cause of scientific agriculture among the young in Indiana and other States of North America. The boys and girls who mean to enter for the competition form themselves into clubs which meet at stated intervals under the personal supervision of school teachers to further the educational side of the movement, and the contests themselves which are decided at shows held annually in some central hall are in corn-growing for the boys and in bread-making and sewing for the girls.—M. L. H.

Copper Sulphate and Manganese Sulphate upon the Growth of Barley, The Influence of. W. E. Brenchley (*Ann. Bot.* vol. xxiv. July 1910, pp. 571-583; 1 plate).—Experiments were made to ascertain the effect of varying concentrations of copper as sulphate on the growth of barley (1) in the absence of nutrient salts and (2) in the presence of the full complement of nutrient salts. The results showed

that the action of the poison in dilute solutions is masked by the presence of the nutrient salts, which thus enable plants when grown in such solutions as water-cultures to endure to a much greater concentration of the toxic substance than in the absence of nutrients. Copper sulphate, a definite poison to barley, does not have any stimulative effect in very dilute solutions, even at so low a concentration as one in ten million.

The experiments with manganese sulphate showed that this substance, though not an actual toxic to barley, retards its growth considerably if supplied in moderate quantities. Very minute quantities have a decidedly stimulative action both on the root and shoot.

A. D. C.

Corn, Experiments with. By E. G. Montgomery (*U.S.A. Exp. Stn., Nebraska, Bull.* 112; December 1909; plates).—An account of six years' work in selecting, breeding, and experimental cultivation of Indian corn in Nebraska. The results so far show that:

1. A long type of ear is best.
2. The size of ear depends on environment and is only of importance when it is known under what conditions the plant was grown.
3. A medium depth of kernel is to be preferred.
4. Low ears give as good yield and mature earlier.
5. Large or small stalks do not yield as well as stalks just above the medium in size.
6. The amount of leaf does not seem to be related to yield.
7. Strains capable of producing ear-bearing tillers or suckers yield best.
8. Barren plants decrease yield.—M. L. H.

Corn Root-Aphis, Contributions to a Knowledge of. By R. A. Vickery (*U.S.A. Dep. Agr. Bur. Entom., Bull.* 85; part vi.; July 12, 1910; 6 figs., 1 plate).—The corn root-aphis (*Aphis maidi-radici* Forbes) is one of the many insects that infest the corn plant. Among its other food-plants are pumpkin, squash, strawberries, cultivated asters, and probably dahlias and French artichokes. It was first noted by Walsh in 1862 and has received considerable attention since from economic entomologists. In Illinois the eggs are found hatching in the fields from April 8 to May 22, and from ten to twenty-two generations may follow. Sexual forms are produced in the latter part of September and October, and eggs are laid in October and November but do not hatch until the following spring. There is a form which feeds on fleabanes (*Erigeron*) and on wild asters, described by Cyrus Thomas in 1879 as *Aphis middletoni*. This is probably a distinct species, although further study may show that it is the same as *Aphis maidi-radici*, in which case both forms would be known as *Aphis middletoni* Thos.—V. G. J.

Corn Stalk-Borer, The Larger (*Diatraea saccharalis* Fab.) By George G. Ainslie (*U.S.A. Dep. Agr. Bur. Entom., Circ.* 116; Revision

of Circ. 16; February 7, 1910; 4 figs.).—This insect was originally an enemy of the sugar cane, but transferred its attention to corn in the southern part of Carolina, where sugar and corn are grown over the same territory. It is the larva of a smoky yellow moth which lays its eggs in the early evening on the upper side of the leaves. The larvae hatch in from seven to ten days and commence to eat the growing tender tip and upper leafy portion of the plant; they then descend to the lower part of the stalk and tunnel in the pith. This weakens the plant so that a high wind late in the season before the corn is matured breaks off the plants at the surface of the ground.

There are two generations a year, the first one pupates in the stalk and the second in the root.

Rotation of crops is the best general preventive of injury from insects affecting field crops, and the thorough early destruction of stalks and stubble remaining on the field is recommended.—V. G. J.

Corylopsis Veitchiana (*Bot. Mag.* tab. 8349).—Nat. ord. *Hamamelidaceae*. Central China. Shrub 5-6 feet high, of a bushy, rounded habit; leaves elliptic, acute, 3-4 inches long; flowering branches, spicate, 1-2 inches long; calyx greenish-yellow; petals 5, primrose-yellow, orbicular; nectaries 5, sharply 2-dentate.—G. H.

Cotton, American Upland, Varieties of. By F. Tyler (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 163; February 1910; maps and plates).—A descriptive list of all the varieties of upland cotton now in cultivation in America, an explanation of all the terms used on the subject, and some notes on the influence of soil and climate on different varieties.—M. L. H.

Cotton Bolls, Plant-Bugs Injurious to. By A. W. Morrill, Ph. D. (*U.S.A. Dep. Agr. Bur. Entom., Bull.* 86; June 14, 1910; 5 plates, 25 figs., 31 tables).—This bulletin deals principally with the conchuela (*Pentatoma ligata* Say.), but gives descriptions of other insects detrimental to the cotton boll, among which are: The grain bug (*P. sayi* Stål.), the brown cotton bug (*Euschistus servus* Say), the green soldier bug (*Neyara hilaris* Say.), and the leaf-footed plant bugs (*Leptoglossus phyllopus* L., *L. oppositus* Say., and *L. zonatus* Dall.). These pests, in addition to destroying many cotton bolls and thus adding to the injury done by the cotton boll weevil, cause more or less staining of the fibre, which reduces the quality and value.—V. G. J.

Cotton in Leeward Islands, Manurial Experiments with. By H. A. Tempany (*West Indian Bull.* vol. x. 3, p. 269, 1910).—A record of continued experiments with the results obtained. In St. Kitts the application of manure, on the whole, showed no marked difference in the yield of cotton, the no-manure plot giving a higher average per acre (during five years) than those manured.

In Monserrat the largest return (all were high) was given by plot 9 in which sulphate of ammonia (20 lb. of nitrogen) resulted in an increase of 312 lb. of seed cotton.

But the general results of the experiments in St. Kitts, Monserrat and Antigua are that no appreciable increase is traceable to the application of manures.

If used they might be considered as an investment towards future fertility.—C. H. L.

Cotton in the Leeward Islands, Manurial Experiments with.

By H. A. Tempany (*West Indian Bull.* vol. xi., No. 1, p. 60, 1910).—These notes are a continuation of those given in preceding numbers as to the effect of manure on cotton, and the result gives no cause for altering the opinion laid down in vol. x. p. 273, viz., that under conditions obtaining on the Leeward Islands, with soils in moderately good tilth, the application of natural and artificial manures is unremunerative.

The experiments cover a period of six years.—C. H. L.

Crown-gall and Hairy-root of the Apple Tree, Field Studies of the.

By G. G. Hedgcock (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 186, November 1910, plates).—This disease is variously known as "galls," "crown-gall," "crown-knot," "hairy-root," "woolly-knot," "broom-root," "root-knots," "root galls," and "tumours." The present bulletin deals with the disease as manifested in the apple and the author concludes as the result of experiment, that, in spite of the apprehension of many growers and investigators, "in the case of the milder and usual forms of the disease little or no injury is appreciable in young orchards. More intense forms may be injurious, but in an orchard these rarely develop from the milder forms."

The form of the galls varies in the apple, "soft" and "hard" galls being distinguished. The former are most common on young trees and vary in size from a pea to a man's head. They originate in wounds and become coarsely convoluted through unequal growth and curled and distorted masses of wood cells and vessels are gradually formed within the softer tissues. They do not produce roots from their surface and often decay at the end of the growing season. The hard crown galls usually occur on older roots. They are at first similar to the soft galls but later become covered with bark and develop a woody interior. They do not decay but enlarge in the next season, and they often produce roots from their surface. In addition to the galls four forms of "hairy-root" are distinguished. The first is termed "simple hairy-root" and is most common on seedlings. It takes the form of numerous succulent roots growing out at right angles either singly or in tufts from an older root or stem. The second form—the "woolly-knot" form—is common on older seedlings and budded trees. In this numerous similar roots develop from a swelling on an older root or from one of the hard galls. The "broom-root" form occurs mostly in the Missouri River district on budded and grafted trees. It consists of numerous succulent roots developed by the repeated branching of root ends, which usually grow upwards from their point of origin towards the surface of the soil. The fourth "aerial" form

occurs on trunks and limbs of apple trees, mostly older ones. Swellings occur on the stems, and roots attempt to break through the bark of them but dry up forming small warts upon the surface. This is probably the most common form of "crown-gall" in this country.

The galls are due to the presence of the bacterium *Bacillus tumefaciens* (see *Journal R.H.S.* vol. xxxiv. p. 577).

The results of numerous experiments are detailed and a large number of observations on the behaviour of trees affected by crown-gall are quoted.

There appears to be some difference in the degree of susceptibility in the different varieties and it was found that the disease was not communicable to healthy uninjured seedlings but that wounded seedlings were susceptible. The spread of the disease by the use of diseased scions is very frequent, but after the first year the spread is practically negligible and the pruning and grafting knives are not responsible for much of it.

The author believes the crown-gall organism to be so widely distributed in the States that any system of eradication must fail, and as the disease, according to the author, rarely does much harm, and does not greatly spread, he advises leaving affected trees. He recommends that wherever possible trees should be budded instead of root-grafted and it may be that the comparative rarity of the root forms of the disease in England is due to the practice of budding instead of root-grafting. Root-grafting has found favour in the States as a means of checking the ravages of woolly aphis. The use of ordinary calico for wrapping grafts proved much better than anything else except rubber, and the cost of the latter is prohibitive. It was more successful in keeping out the germs of crown-gall than waxed cloth, waxed thread, and so on. Other general notes upon careful cultivation are given and the bulletin ends with a list of papers referring to crown-gall.

F. J. C.

Crown-Gall of Plants: its Cause and Remedy. By E. F. Smith, N. A. Brown, and C. O. Townsend (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 213; February 1911; illustrations).—The authors give a history of our knowledge of the disease in various parts of the world and of the discovery of the bacillus which is its cause (*Bacterium tumefaciens*). Inoculation experiments were carried out since 1906, and the results of these are here reported.

A description of the bacillus, with its staining and cultural characteristics, follows. The thermal death point is about 51° C., while the optimum temperature for development lies between 25° and 28° C.

It has been found to attack (at least when purposely inoculated into the plant) Compositae, Solanaceae, Oleaceae, Umbelliferae, Vitaceae, Leguminosae, Rosaceae, Cruciferae, Caryophyllaceae, Chenopodiaceae, Urticaceae, Juglandaceae, and Salicaceae, and natural galls have been studied on peach, apple, rose, quince, honeysuckle, *Arbutus Unedo*, cotton, poplar, chestnut, alfalfa, grape, hop, beet, salsify,

turnip, parsnip, lettuce, and willow. In many cases the disease may be readily transmitted from one plant to another.

The authors believe that the attack is of serious moment, particularly in certain plants, and that though it progresses slowly, it stunts the plant first and finally destroys it, unless removed by extirpation, or by the development of increased resistance on the part of the plant. While the organism is moderately susceptible to the action of germicides, it cannot be reached in the tissues of the plants, nor is extirpation of the diseased tissues and subsequent treatment with germicides always satisfactory.

The authors recommend the continuance of rigid State inspection with rejection of diseased nursery stock.

Some interesting and suggestive comparisons between this disease and tumours, &c., in animals are made, and the discovery of a new disease on sugar beet (*q.v.*) is announced.—*F. J. C.*

“Crown Gall,” occurrence in England (*Jour. Bd. Agr.* vol. xvii. p. 617, November 1910; plate).—A well-known and destructive disease in U.S.A., has occurred in England on plum, rose, raspberry and chrysanthemum plants. Galls occur on crown or collar region of stem and vary in size from a pea to that of a cricket-ball. Though doubt exists as to the exact organism, there is no dispute as to the cause being the presence of a living organism. When trees are not badly diseased development may be arrested by removing the galls, and covering the wounds with a paste composed of 1 part sulphate of iron, 2 parts sulphate of copper, 3 parts quicklime. The most economical course is to remove and burn all infected trees and work quicklime into the soil.—*W. S.*

Crown-rot, Arsenical Poisoning and Winter Injury. By J. G. Grossenbacher (*U.S.A. Exp. Stn., New York, Tech. Bull.* 12; December 1909; 8 plates).—The terms crown-rot and collar-rot are indefinite, as they include a rotting of the upper roots and sometimes partial decortication of the trunks. They may be regarded as group names to designate fruit-tree injuries which usually begin at the collar, near the ground line, and frequently at the uppermost roots, and extend both up and down, browning and killing both bark and wood. This kind of injury is more or less destructive throughout the best apple-growing States.

The first indication of injury is sometimes the early yellowing of the foliage in the autumn, such trees being found to have wounds at their crowns or about the upper end of the stocks. In an orchard of 170 Ben Davis trees nineteen were found to be affected, and of these six were so bad as to justify their destruction. The injuries consisted in many cases of long narrow dead regions with more or less decayed bark surrounded by thin irregular callus ridges of two to three years' growth. Some trees had only one to three wounds around their crowns ranging from one-half to three inches wide and from two to five inches

long, while others were entirely girdled. The small wounds were usually about the upper angles of the roots, and in cases of completely girdled trees all lateral roots in the girdle were dead and decorticated.

Another orchard which was inspected was found to have old crown-rot scars on more than six per cent. of the trees—areas of bare wood of various size surrounded by about thirteen-year-old callus rolls. It is suggested that the injuries all originated the same winter, and that the good soil enabled the trees to recover.

Crown-rot has been attributed to parasitic organisms, to arsenical poisoning, and to low temperatures. The author thinks there is little doubt that it is due primarily to low temperatures, late maturity of young wood being specially favourable to injury from this cause. Though parasitic organisms have been found on affected parts there is at present nothing to prove that they are other than wound parasites. Much investigation remains to be done, and the result may be new methods of orchard management which will increase the winter hardiness of the trees. At the end of the bulletin is a list of publications bearing upon this and kindred subjects.—A. P.

Dendrobium Sanderæ (*Bot. Mag.* tab. 8351).—Nat. ord. *Orchidaceæ*; tribe *Epidendreae*. S.-E. Asia. Epiphyte; leaves 2 inches long; racemes 1 inch long, 3-4 flowered; flowers large, white, with purple stripes on the disk and lateral lobes of the lip.—G. H.

Dimorphotheca. By J. M. Duvernay (*Le Jard.* xxiv. 565, p. 264, September 5, 1910; with coloured plate).—This article enumerates the various species of *Dimorphotheca*, including the now well-known Barberton Daisies, and gave directions for their cultivation.—F. A. W.

Diseases of cultivated plants in West Indies, Fungi causing. By C. K. Bancroft (*West Indian Bull.* vol. xi. 3, p. 235; 1910).—" . . . A brief descriptive account of those fungi which have from time to time been reported to be injurious to cultivated crops in the West Indies " supported by references to authorities on each fungus. Appendices include: Diseases due to bacteria, diseases due to physiological causes. There is also an index of host plants and of parasites.
C. H. L.

Diseases of Garden Crops and their Control. By N. J. Giddings (*U.S.A. Exp. Stn., West Virginia, Bull.* 123, May 1909).—Short notes on the commoner diseases of garden crops, as to the appearance of infected plants, &c., and formulæ for the simpler remedies are given with directions how to apply them. The author points out that some diseases, especially those due to bacteria may be spread by beetles and other gnawing insects, and recommends taking measures to keep them down both under glass and in the open.
D. M. C.

Disinfection of Imported Plants. By H. A. Ballou (*West Indian Bull.* vol. x., 4, p. 349; 1910).—This paper contains sum-

maries of the laws in force in the West Indies at the present time, together with directions for preparing and using insecticides and fungicides, and general accounts of hydrocyanic acid gas, carbon bisulphide, sulphur dioxide, Bordeaux mixture, and corrosive sublimate. References and titles of books bearing on the subject are given.

(1) Hydrocyanic acid gas. Very poisonous. Injurious to leaves of plants.

1oz. of cyanide for each 300 cubic feet (1 grain to 10 cubic feet).

Amount of sulphuric acid is $1\frac{1}{2}$ times that of cyanide.

Amount of water $1\frac{1}{2}$ times that of acid.

It is useful against scale, mealy bug and any pest on surface of plant.

Plants and leaves must not be *wet*.

Use *good* cyanide (98 per cent.) and high grade sulphuric acid.

(2) Carbon bisulphide.—Does not injure foliage and with ordinary care not dangerous to operator.

Heavier than air and inflammable, penetrates *downwards*.

1lb. per 1,000 cubic feet (1lb. to 100 bushels of grain) apply from *above*.

For ants, 1 or 2 oz. of liquid, in several doses, stopping up holes.

Improves growth of crops where it has been used.

(3) Sulphur dioxide.—Destructive to living plants but used to fumigate cotton seed for oil. Kills insects and rodents. Very penetrating.

Used for fumigating dwelling houses.

Use 5 per cent. gas and leave room closed 24 hours.

(4) Bordeaux mixture.—Copper sulphate 4 lb., lime 4 lb., 50 gallons. With the addition of Paris green, arsenate of lead, &c., may be sprayed on trees and kill insects as well as fungi.

Arsenic more adhesive with Bordeaux mixture than without.

(5) Corrosive sublimate.—Used to treat cotton seed for planting. Also used for storing against insects and rodents.

Injures tissues of living plants.

1lb. to 100 gallons or 1oz. to $7\frac{1}{2}$ gallons water.

Immerse seed completely, shake thoroughly, then dry seed.

C. H. L.

Dry-Lands in the Great Basin. By F. D. Farrell (U.S.A. Dep. Agr., Bur. Pl. Ind., Circ. 61; July 1910).—Investigations conducted on experimental farms in connexion with State experiment stations with a view :

(1) To submit to comparative tests varieties of different grain crops from all sections of the country and from foreign countries having the same climate and soil conditions.

(2) To develop pure types through selection from which to increase seed for distribution and to obtain foundation stocks for further improvement.

(3) To produce winter-resistant types in order to extend the area of winter grain.

(4) To determine the best cultural methods.

The experiments were chiefly concerned with grains, wheat, oats, and barley (winter and spring varieties of each), besides which promising results were obtained with alfalfa, while broom-grass, sorghums, peas, corn, potatoes, and sugar-beets were also tested. One of the grains tested was "Emmer" (Black winter var.), little known in the United States, botanically closely related to wheat, but resembling barley, and valuable chiefly as a stock food. It resists draught and has proved extremely hardy in Utah. It produces a high yield and is much relished by horses, hogs, and sheep.—*C. H. L.*

Eelworms (*Gard. Mag.*, No. 2954, June 11, 1910, pp. 455).—Experiments on various methods of destroying eelworms have been carried on by Dr. G. E. Stone, of the Massachusetts experimental station. The use of lime and formalin were found to have little result, and the latter is very injurious to plants.

More success was obtained by sterilization with steam pipes to at least 180°. Freezing the soil for a length of time destroys them, also desiccation, but this is difficult to apply if there is any depth of soil.

In Germany a catch crop like mustard or rape has been used, the plants being pulled up and destroyed. Flooding of soil or manure to be used destroys many.—*E. B.*

Experimental Results, Interpretation of. By J. B. Wood and F. J. M. Stratton (*Jour. Agr. Sci.* iii. pt. 4, pp. 417-440).—After drawing attention to the need for caution in interpreting experimental results the legitimacy of averaging results is discussed. The method of calculating the probable error is described and its meaning explained.

It is found that the probable error in field experiments is about 5 per cent. of the crop. This figure is independent of the size of the plot provided it is 1-80th acre or larger. It is useless trying to measure differences less than about 20 per cent. by comparing single plots whatever their size. If it is desired to measure small differences the number of plots must be increased either by duplication several times in the same experiment, or by repetition of the experiment at several stations, or for several seasons. If the precision desired in percentage difference between yields is 20 per cent., then 1 plot may be compared with another; if 15 per cent., then 2 plots are required; if 10 per cent., then 4 plots; if 8 per cent., then 6 plots; if 6 per cent., then 10 plots; if 4 per cent., then 23 plots; if 2 per cent., then 91 plots.

The whole paper is of great importance and very suggestive to experimenters in all fields.—*F. J. C.*

Felicia petiolata (*Aster petiolatus*). By D. Bois (*Rev. Hort.* August 1, 1910, pp. 550-2; one illustration).—From the illustration and description this plant would appear to be well worthy of attention for sunny rockeries or other situations where a moderately rampant and

persistent flowering species, capable of bearing many degrees of frost, can be accommodated. The flowers, which are abundant, are over an inch in diameter, of a pretty mauve tint with a yellow disc, and are produced almost throughout the year in a cold house, and all through the spring and summer in the open. Culture easy, and can be raised either by seed or cuttings.—*C. T. D.*

Fern Breeding, Selective. By Chas. T. Druery (*Gard. Mag.*, February 5, 1910, No. 2936).—Details of the results obtained by sowing spores of carefully selected varieties are given, and the parentage of many well-known and very beautiful plants now grown.

E. B.

Formalin, the Effect of, on the Vitality of Seed Grain. By R. Stewart and J. Stephens (*U.S.A. Exp. Stn. Utah, Bull.* 108; April 1910).—These experiments were undertaken in consequence of complaints by farmers that:

1. The formalin treatment injured the germinating power of the seed to such an extent that the crop yield was seriously affected.

2. The formalin treatment was not effective in destroying smut spores.

3. If for any reason the planting of the treated seed was delayed, it had a tendency to spoil.

4. The formalin sold in the State of Utah had a tendency to lose its strength.

5. The formalin sold in the State was not up to the standard.

They are said to have resulted in the following conclusions:

1. The formalin treatment is effective in preventing the loose and covered smut of oats, the covered smut of barley and bunt of wheat.

2. The formalin solution, even as dilute as one pound of formalin to sixty gallons of water, reduces somewhat the vitality of the seeds of wheat, oats, and barley.

3. Oats are more resistant to the influence of formalin than wheat and barley are.

4. The best strength of solution to use is one pound of formalin to fifty gallons of water.

5. The seeds may safely be treated for one hour in a solution of one pound to fifty gallons of water.

6. If the treated seed be thoroughly dried, it may be safely kept for at least six weeks after treatment.—*M. L. H.*

Fruits, Accelerating the Ripening of (*Gard. Mag.*, January 15, 1910, No. 2933, pp. 48).—Professor A. E. Vinson, of the Arizona Experimental Agricultural Station, has succeeded in ripening the fruit of date palms in less than three days. It was known that Arabs applied cloths moistened with vinegar to bunches of dates in order to "sweeten up" unripe fruits. Sprays of fruit subjected to a vapour of acetic acid at a temperature of 45°C. for twelve to fifteen hours

become nearly transparent and ripen naturally without further treatment.

Fresh ripe dates are very soft and deteriorate quickly, due to the inversion of cane sugar, and the flavour is much injured. By artificially ripening they could be placed on the table with their full quota of cane sugar and no loss of flavour.—*E. B.*

Fruits, Culture of Small. By C. I. Lewis and C. A. Cole (*U.S.A. Exp. Stn., Oregon, Bull.* 105; March 1909; 12 plates).—Full details are given of the routine work of cultivation, gathering, and marketing of all the usually grown small fruits, as well as of black caps, cranberries, and phenomenal berries, the latter, which resemble the loganberry, being one of Burbank's productions (dewberry and raspberry).

Strawberry growing has reached a high standard in this State, as much as \$1,500 worth having been picked from a single acre. In the raising of young plants it is recommended to grow parent plants specially for that purpose, such plants never being allowed to fruit, nor, during the first year of growth, to produce any runners, and subsequently only half the number they would do naturally (p. 5). Young plants intended for fruiting should be allowed to produce neither fruit nor runners the first year, and should always be carefully summer pruned. Many good varieties are self-sterile in the States, needing some variety which is an abundant pollen-producer to be planted in connexion with them (p. 11).—*A. P.*

Garden, Botanic, Nongko Djadjar, nr. Lawang in East Java. By M. Buysman (*Die Gart.* p. 602, November 19, 1910).—At an altitude of 1,230 metres. *Herminiera elaphiozylon*, from Senegambia, is a tree which seems to be exceedingly rare and difficult to grow; it has orange-coloured flowers, and the wood is very light and is used for the same purpose as cork. It grows well here, and there will be a large quantity of seeds to spare. In its native habitat it invariably grows near rivers. The pinnate leaves are of a bright green, and the branches and stem have very large sharp thorns.

Hunnemannia fumariifolia grows into a large shrub and flowers uninterruptedly, but suffers sometimes through heavy rains.

Mimosa species grow rapidly, and in less than a year form good-sized trees and are continuous-flowering.

Platycodon (Campanula) grandiflora is always in flower, but the plants remain rather dwarf.

Carica Papaya fruited six months after sowing.

European weeds, such as *Senecio vulgaris* and many others, all quite plentiful, grow and increase as well here as in Europe. European fruit and vegetables grow fairly or very well, but they are tasteless.

Oranges grow well and fruit quickly, but no matter how long they remain on the trees they are always green and never sweet; the same happens on the Philippine Islands.—*G. R.*

Grafts, inverse. By L. Damel (*Rev. Hort.* October 16, 1910; pp. 469-471; three illustrations).—An interesting article on inverse

grafting, such as, for example, the Potato on the Tomato and vice versa, and the effect of stock on scion in these and other cases. The curious fact is mentioned that while the Pear is easily grafted on the Quince, it is impossible to graft the Quince on the Pear, though successful union in the one case would seem to imply it in the other.

C. T. D.

Grape-Spraying Experiments in Michigan in 1909. By Lon. A. Hawkins (*U.S.A. Dep. Agr., Bur. Pl. Ind. Circ. 65*; September 27, 1910; 3 plates, 4 tables).—Black-rot is a most destructive disease of the grape in the eastern United States and is caused by the fungus *Guignardia Bidwellii* (Ell.). It first appears in the spring in the form of brown spots on the leaves, upon which a number of black pustules develop. These contain the "summer spores," minute rounded bodies which are scattered by the wind and rain. When they alight on the leaves, shoots, stems, or berries they send out tubes which penetrate and destroy the tissues. The affected grapes shrivel up and become mummied and covered with the spore-containing black pustules. "Winter spores" are common on the old mummied grapes in spring and summer, and are an efficient means of reproducing and distributing the fungus.

Experiments have been made with sprayings of (1) Bordeaux mixture from various formulæ; (2) neutral copper acetate prepared with 1 lb. neutral copper acetate dissolved in 50 gallons of water; (3) ammoniacal copper carbonate prepared by dissolving 6 oz. copper carbonate in three pints strong ammonia and adding it to 50 gallons water; (4) self-boiled lime-sulphur; (5) commercial lime-sulphur.

It was found in these experiments that the best fungicide was Bordeaux mixture made with 4 lb. copper sulphate, 3 lb. lime to 50 gallons water. Five applications of this preparation *thoroughly applied* completely controlled the disease.

Neutral copper acetate and ammoniacal copper carbonate were rather inclined to injure the foliage, and lime-sulphur mixtures, commercial and otherwise, were not suitable fungicides for grapes.—V. G. J.

Grease-banding of Fruit Trees. By F. V. Theobald, M.A. F.E.S. (*Jour. Bd. Agr.* vol. xvii. p. 542. October 1910).—Experiments extending over six years (1) to find out what insects harmful to fruit trees are actually caught in the grease-bands and the period of their appearance, (2) the best position to band the trees, (3) the most successful class of grease to use. The conclusions arrived at are: (1) Grease-banding should be carried out fully from October to mid-April. (2) Other injurious insects besides winter moths and their allies are caught. (3) All greases except Tanglefoot, placed directly on the bark are injurious. (4) The bands are best placed not less than 4 feet from the ground. (5) Thick parchment paper, grease-proof, if possible on both sides, is required.—W. S.

Hemp in the United States, The Cultivation of. By Lyster H. Deevey (*U.S.A. Dep. Agr., Bur. Pl. Ind., Circ. 57*; May 1910).—

Hemp (*Cannabis sativa*) is grown for fibre in Europe, China, Japan, and the United States.

The latter use all they grow and import more besides. Hemp is a crop that requires bottom moisture with a rich, alluvial, or loamy soil in which nitrogen and lime are present.

After sowing (broad cast and rolled) it requires no further attention till harvesting.

It takes 110 days for its growth, and should produce about 1000 lb. of fibre from an acre.

The average cost per acre is \$30, and gross returns about \$50.

C. H. L.

Hop Flea-Beetle, by F. H. Chittenden, Sc.D., and **The Life History and Control of the Hop Flea-Beetle**, by William B. Parker (*U.S.A. Dep. Agr. Bur. Entom., Bull. 66; part vi., and 82, part iv.; May 1909-10; illustrated*).—These bulletins give very full accounts of the hop flea-beetle (*Psylliodes punctulata* Melsh), which is a native American species, quite distinct from any species found on hops in England or on the Continent.

The beetle feeds freely on rhubarb, sugar beet, and certain truck crops, but was not known as a serious pest until it began its depredations in the hop fields of the Chilliwack and Agassiz Valleys of British Columbia a few years ago.—V. G. J.

Houlletia Sanderi (*Bot. Mag. tab. 8346*).—Nat. ord. *Orchidaceae*; tribe *Vandeeae*. Peru. Herb; pseudobulb broad-oblong; leaves 12 inches long; scape erect, 12 inches long, 2-3 flowered; flowers large, pale-yellow; petals nearly orbicular.—G. H.

Hydrangeas, New. By R. Rouhard (*Rev. Hort. August 16, 1910; pp. 386-7; one illustration*).—A descriptive list of several obtained by Lemoine et fils, Nantes. Amongst others there are noteworthy 'Dentille' (figured), dwarf and very floriferous; 'Bouquet Rose,' large flowers passing from pink to red rose; 'La Lorraine,' enormous corymbs, similar colours; 'Fratcheur,' enormous corymbs, white, rose-tinted, mauve centre, spotted greenish; 'Avalanche,' fine white; 'Ornement,' rose lilac; 'Innocence,' cream-white petals, undulate; 'Mont Rose,' immense branched panicles flowering successively; 'Mousseline,' nearly flat panicles, mauve with cream centre; and 'Radiant,' nearly hemispherical corymbs, deep-rose carmine, deepest coloured of the group.—C. T. D.

Ilex Pernyi (*Gard. Mag., No. 2976; November 12, 1910, pp. 896*).—An interesting holly from China. It appears to thrive under the same conditions which suit the common holly, and attains a height of 12 to 15 feet or more. The leaves are deep green, glossy, of thick texture with spiny margins, small red fruits in axillary clusters. It has a distinct appearance. Seedlings are said to exhibit some variation.—E. B.

Impatiens Petersiana. By S. Mottel (*Rev. Hort.* October 1, 1910; pp. 451-4; one illustration, one coloured plate.)—The latter represents an inflorescence of rich crimson flowers, with rose undersides and bronzy foliage, very attractive. Plant about two feet high Perpetual flowerer, outside in summer and under glass in winter.

C. T. D.

Impatiens peltata and I. Vaughanii. By Sir J. Hooker (*Kew Bull.* 1911, p. 249).—Species from Malay, the former with peltate leaves and a few small, pink flowers, the latter with lower segments of flower, greenish yellow, spur cream, and other segments deep violet to purple.—F. J. C.

Inoculation, Methods of Legume. By K. F. Kellerman (*U.S.A. Dep. Agr., Bur. Pl. Ind., Circ.* 63; May 1910; 3 pp.).—This deals with the inoculation of new lands with the bacteria which develop nodules upon the roots of leguminous plants. The advantages of the use of artificial cultures lie in the greater ease of their transportation and application, as well as in the absence of the danger of introducing harmful weeds, which is incident to the method of transferring soil from other fields upon which the particular crops in view develop abundance of nodules upon their roots, though this latter practice is the more certain of the two, especially in the case of alfalfa. Both methods will fail if the crop which is being experimented with is not adapted to the locality, or if the climatic conditions during the growing season are unfavourable. In the soil transfer method it is recommended to sow 200 to 300 lb. per acre on a cloudy day, or towards evening, and harrow it in immediately, as bright sunshine is very harmful to the bacteria.—A. P.

Inspection in North Carolina, Nursery. By F. Sherman (*Jour. Econ. Entom.* vol. 2, pt. 6, pp. 382-385. December 1909).—Nurseries are carefully inspected and if few trees are found infested with San José Scale these are destroyed and the nursery certified. If large numbers are involved a second inspection is undertaken at the charge of the nurseryman, and if this is insufficient the block is ordered to be destroyed, and means are taken to see that it is destroyed. All stock is required to be fumigated with hydrocyanic acid gas before being distributed from the nursery; in doubtful cases this is done by the inspector but usually by the nurseryman.

The qualifications of the inspector are that he should be capable of recognizing the important insect and fungus pests of the nursery. He should also be acquainted with nursery practices, customs, etc.

Under the system in vogue the average condition of the nurseries is steadily improving though the scale is found in an increasing number of nurseries each year.—F. J. C.

Iris Wilsonii (*Bot. Mag.* tab. 8340).—Nat. ord. *Iridaceae*; tribe *Irideae*. China. Herb, rhizome short, leaves 1-2 feet long, 3-4 lines

wide; stem 8-12 inches high; perianth: sepals 2 inches long, pale-yellow, spotted with purple; petals erect, 1 inch long, pale yellow; style arms, deeper yellow.—*G. H.*

Iris, Regelio-cyclus. By F. Demo (*Rev. Hort.* September 16, pp. 428-9; coloured plate).—The plate represents two very charmingly tinted forms—'Artemis,' purple lilac, veined with deep purple, with plum-coloured patches, a cross between *I. Korolkowii concolor*, perhaps the least vigorous of the Regelia section, and *I. Mariae*, the least floriferous of the Oncocyclus, and yet the offspring is very vigorous, and twenty-two flowers have been counted on one plant; 'Isis,' *I. Korolkowii* × *I. Susiana*, is a rosy violet, purple veined, with outer segments mahogany colour, veined with deep brown. Other fine hybrid varieties are described.—*C. T. D.*

Irrigation in Idaho. By James Stephenson (*U.S.A. Dep. Agr., Off. Exp. Stn. Bull.* 216; September 1909; map).—There is an area of 65,000 square miles in Idaho in which agriculture cannot be carried on without irrigation, and this bulletin contains an account of the various efforts that are being made to provide this irrigation by private enterprise, by water companies under the provisions of irrigation laws, by Government, and by local public bodies. These efforts are still in their infancy, however, and the State irrigation laws themselves are still incomplete as far as regards some of the more thorny questions of private water rights on all the streams and sources of supply and of the relative rights between the citizens of different States claiming water from inter-State streams.—*M. L. H.*

Irrigation Investigations. By J. A. Widtson (*U.S.A. Exp. Stn., Utah, Bull.* 105; August 1909; plates).—An account of a series of experiments undertaken at Utah for the purpose of determining the conditions under which a maximum amount of vegetable substance of best quality may be produced with a minimum amount of water. The methods employed were to grow plants in pots filled with known weights of differently composed soils and to which definite amounts of water were applied. Four different varieties of soil were used, the water was applied in varying amounts, and the soil was previously treated in various ways. Tables of the results of each experiment are given and a summary of the whole shows that:

1. Cultivation or hoeing largely reduced the evaporation of water from bare soils.
2. Cultivation increased generally the yield of dry matter.
3. Cultivation is much more effective on clay and sand soils than on ordinary loam.
4. Cultivation diminished largely the amount of water transpired for one pound of dry matter.
5. Shading diminished greatly the evaporation from bare soils.
6. More water evaporated from bare soils under surface irrigation than under sub-irrigation or when the water stands near the surface.

7. In the majority of cases surface irrigation gave the largest yields of dry matter, sub-irrigation nearly as much, and standing water the smallest yields.

8. Approximately the same number of pounds of water are required to produce a pound of dry matter under conditions of sub-irrigation and standing water, a somewhat larger number is required under conditions of surface irrigation.

9. Probably the number of pounds of water actually transpired for the production of a pound of dry matter is the same under the various methods of irrigation.

10. Sub-irrigation is most satisfactorily on loam soils.

11. The evaporation of water from bare soils increased with the increased saturation of the soil. The increase in the lots was usually much larger than the increase in saturation. Heavy irrigations should, therefore, be followed by immediate, careful, and thorough cultivation.

12. Increasing the saturation of soils increased in a somewhat larger ratio the yields of dry matter.

13. Approximately the same number of pounds of water are required under various conditions of soil saturation for the production of one pound of dry matter.

14. The amount of water actually transpired for each pound of dry matter appears to be somewhat lower under conditions of high saturation.

15. On fertile soils heavy applications of water are not likely to be so wasteful as on infertile soils.

16. The yield of dry matter was much larger on soils that had rested during the three preceding years than on soils that had been cropped during the same period.

17. The number of pounds of water required for one pound of dry matter was much smaller on the soils that had been bare than on those that had been cropped during the preceding three years.

18. Fertile soils will produce crops with a smaller amount of water than will unfertile soils.

19. The additions of fertilizers to infertile soils enables crops to produce dry matter at a lower water cost.

20. Soils vary greatly in their relationship to plants and water.

21. The seasons have a strong effect upon the yield of dry matter and upon the amount of water required for the production of one pound of dry matter.

22. The number of pounds of water required for the production of a pound of dry matter varies greatly with the crop, the soil, the season, the method of irrigation, and the cultivation. In general, however, the amount of water required for the production of dry matter is very much higher in an arid region than in regions of abundant rainfall. The conservation of moisture is therefore of greater importance in the west than in the east of N. America.

23. Summer fallowing should be practised on dry farms, first, to store the precipitation of two or more years for the use of one crop, and secondly, to set free an abundance of plant food which will enable crops to mature with less water.

The total dry matter referred to in these experiments refers to the part of the plant above ground, excepting in the case of the sugar-beets in which the roots and leaves were weighed together.—*M. L. H.*

Irrigation in N. Dakota. By T. R. Atkinson (*U.S.A. Dep. Agr., Off. Exp. Stn., Bull.* 219; September 1910; maps).—A short account of the general features and irrigation possibilities of N. Dakota, a history of recent legislation on the subject, and a list of the various irrigation schemes which have been or are in process of being carried out throughout the State.—*M. L. H.*

Jacobinia suberecta (*Bot. Mag.* tab. 8350).—Nat. ord. *Acanthaceae*; tribe *Justicaeae*. Uruguay. Herb, leaves $2\frac{1}{2}$ inches long; cymes peduncled, 5-10 flowered; corolla 2-lipped, bright scarlet, $1\frac{1}{4}$ inches long.—*G. H.*

Juncaceae, Parasitic Root Diseases of. By E. J. Schwartz (*Ann. Bot.* vol. xxiv. July 1910, pp. 511-521).—The roots of *Juncus Bufonius*, *J. articulatus*, and *J. lamprocarpus* are found to be subject to attacks of two distinct parasites—viz. the fungus *Entorhiza cypericola* and the Myxomycete *Sorosphaera Junci*.

The life-history of *S. Junci* is dealt with in detail. It usually gains entrance to the plant by the root hairs, though direct infection through the cells of the young root is also probable; it is first noticeable as an amoeba-like body. The outer cells only of the root are infected, and there is no hypertrophy as in the case of *S. Veronicae* or *Plasmodiophora*. The amoebæ increase in size, but do not coalesce to form plasmodia. Ultimately they give rise to a mass of spores.

In the case of *Entorhiza* the roots infected form small tubercles, the cells of the cortex being occupied with the fungus. Infection appears to take place by means of the entry of conidia into the root hairs. The mycelium penetrates the root and gives rise to masses of dark spores in the cortical layers. *Entorhiza* is probably allied to the *Ustilagineae*.—*A. D. C.*

Leafroller, The oblique-banded. By E. Dwight Sanderson and A. D. Jackson (*Jour. Econ. Entom.* vol. ii. pt. 6, pp. 391-403; December 1909; plates).—The larvæ of this tortrix moth (*Archips rosaceana* Harris) occasionally cause severe damage to roses and a bad case is here reported and many new details concerning its life history are given. The pest had been imported into the New Hampshire nursery on 'Killarney' roses from Ohio, and had spread rapidly through the house. When the attack is mild the lower leaves only are damaged but where it is severe the terminal leaves are rolled together and the larva burrows into the bud thus checking growth and destroying flowers.

It is widely distributed in the United States and feeds on a variety of plants. The larvæ appear in spring and attack the young foliage as soon as it opens. These larvæ mature by the end of May, and a second brood is produced. The eggs are laid on the lower leaves. It is not known how the insect passes the winter but it appears probable that the larval state persists through the winter. A description of the moth is given in the *Proc. Acad. Nat. Sci. Phila.* 347 (1860), and of the larva, pupa and egg masses here. The larva is generally light green but varies to a reddish or brownish green and generally has a darker green stripe along the back; the head is dark brown or black with brown mottling.

The eggs are often parasitized and this keeps the pest well in check as a rule.

Fumigation with hydrocyanic acid was found ineffective but spraying with lead arsenate promised well, though hand picking would seem the most effective measure when roses are affected.—*H. J. C.*

Legislation in the West Indies for the Control of Pests and Diseases of Imported Plants. By H. A. Ballou (*West Indian Bull.* vol. xi., 3, 1910, p. 197.)—A summary of the laws passed for the above purpose by the Governments of Jamaica, Trinidad, Windward and Leeward Islands.

The provisions of these laws fall under four heads:

- (1) Total prohibition.
- (2) Destruction of badly-infested plants on arrival.
- (3) Treatment of plants to destroy pests or diseases known or suspected.
- (4) Periodical inspection with power to destroy if necessary.

C. H. L.

Legumes, Additional Notes on Native, in Nebraska and Kansas. By Joseph Allen Warren (*U.S.A. Dep. Agr., Bur. Pl. Ind., Circ.* 70; September 1910).—Being a continuation of the observations made in previous years to confirm or modify conclusions. It would appear that there are more nodules on the roots of annual than perennial legumes. It is possible but not confirmed that the wild legumes may be able to inoculate the soil for cultivated crops (such as clover or alfalfa). Nodules were not discovered on the roots of non-leguminous plants with the exception of the buffalo berry. The most important plants in number and distribution belonged to the genus *Psoralea*.

C. H. L.

Lime Cultivation, Notes on. By H. A. Ballou (*West Indian Bull.* vol. xi. No. 1, p. 39, 1910).—The use of experiment plots in Monserrat has shown that fortnightly hoeing and clean cultivation produce great vigour of growth, and heavy early bearing, but at the expense of severe attacks of scale insects, together with a liability to root disease, and possibly a premature weakening of the constitution.

The principal scale insect pests of limes, are the purple, white, and green scales, of which the first two are most injurious. Their natural

enemies are insects (ladybirds, &c.), and parasitic fungi. The latter attack all three scales.—*C. H. L.*

Lime-Sulphur Mixtures, Experiments with home-made concentrated. By P. J. Parrott and W. J. Schoene (*U.S.A. Exp. Stn., New York, Bull.* 330; December 1910).—A number of experiments with home-made concentrated lime-sulphur spray mixtures were carried out and the results are here reported. A new formula is suggested, viz.

Quick (unslaked) lime	36 lb.
Sulphur	80 lb.
Water	50 gals.

The mixture may be stored and used diluted as required, the dilution being such that the Beaumé hydrometer gives a concentration of about 44°.5 B. for a spray suitable for use against San José Scale, 3°.5 B. for use against pear leaf blister mite, and 1° B. for use as a summer spray on apples against scab, &c.

Success was attained in most cases when the wash was used against these pests and growers appear to be well satisfied with it, apparently preferring it to Bordeaux mixture. Several instances of burning of foliage especially in pears were reported but these were soon obscured by the rapid growth of the shoots and their results were discounted by the superior crops secured through freedom from disease and insect pests. Bordeaux mixture frequently causes russetting of the fruit, but no such effect was produced upon the apples by use of the lime-sulphur mixture.

Various causes are suggested to account for this burning but it is evident that the true reason has not yet been definitely settled.

F. J. C.

Lime-Sulphur Wash, Chemical Investigation of best conditions for making. By L. L. van Slyke, A. W. Bosworth, and C. C. Hedges (*U.S.A. Exp. Stn., New York, Bull.* 329; December 1910).—The object of the investigation carried out and here reported was to ascertain under what conditions the compound made by boiling together sulphur and lime should contain the greatest quantity of calcium pentasulphide (CaS_5).

The amount of sediment is least when the ratio of lime to sulphur is about 1 : 2 and increases with the increase or decrease of the ratio of lime to sulphur. The proportion of sulphur that goes into solution is greatest when the amount of sulphur used is not more than 2.25 times the amount of lime used.

The nature of the sulphides produced depends largely upon the proportions in which the lime, sulphur, and water are used, and when the ratio of sulphur to lime is largest and the ratio of lime and sulphur to water is less than 3 : 1, then the largest proportion of pentasulphide is produced.

As a result of the investigation it is recommended that the standard concentrated lime-sulphur wash should be made by slaking 36 lb. of

lime (pure water; if not pure more must be taken) with ten gallons of hot water added a little at a time; while the slaking is proceeding add 80 lb. of finely divided, high-grade sulphur, and when slaking is completed add enough water to make up to 50 gallons. The mixture should be boiled for one hour keeping the water up to the original level.

It is suggested that the lime to be used should be tested for impurities by boiling one part of it with two parts of sulphur for one hour in plenty of water. The quantity of sediment left will indicate the degree of impurity.—*F. J. C.*

Liver of Sulphur, The Fungicidal Properties of. By F. W. Foreman, B.A., F. I. C. (*Jour. Agr. Sci.* iii. pt. 4, pp. 400-416; December 1910).—Liver of sulphur is a mixture of various compounds of potassium and sulphur or sodium and sulphur. Commercial samples were found to contain free sulphur, free alkali, sulph-hydrates, sulphides, polysulphides, sulphites, thio-sulphates, and thionates of either potassium or sodium. When moistened sulphuretted hydrogen was evolved continuously. It is evident from the figures given that great variation exists between the various preparations on the market.

In order to ascertain to what the fungicidal value of the compound was due attempts were made to germinate spores of *Botrytis cinerea* in the various constituents of the substance respectively, and the author concludes that the "most potent fungicidal agent in the whole mixture" was the free alkali soda, the potassium hydroxide being also poisonous but to a smaller extent. The use of soda instead of potash in the manufacture of the liver of sulphur is therefore recommended.

The spores of American Gooseberry mildew were affected in the same general way as those of *Botrytis* but they were not found to germinate satisfactorily under laboratory conditions.

A method of analysis of commercial liver of sulphur is proposed.

F. J. C.

Manganese in Horticulture. By M. H. Bartmann (*Jour. Soc. Nat. Hort. Fr.*; Ser. 4; vol. xi.; August 1910; p. 530).—As a result of some chemical experiments conducted by M. Gabriel Bertrand the idea occurred to him of using manganese as a fertilizer. The most important experiments in this direction were first undertaken by the Japanese. They achieved wonderful results from its application to rice, *Cryptomeria japonica*, and many vegetables, the good effects being produced, however, only when it was employed in the form of carbonate of manganese.

In Italy manganese sulphate was found to be of great value, though manganese dioxide was quite inefficacious, and experiments in France, Austria, and Holland all showed marked results from its use.

M. L. H.

Micromeles caloneura (*Bot. Mag.* tab. 8335).—Nat. ord. *Rosaceae*; tribe *Pomeae*. Western China. Tree or shrub; leaves

elliptic, oblong, $2\frac{1}{2}$ - $3\frac{1}{2}$ inches long; corymbs 3 inches across; flowers $\frac{1}{4}$ inch across; corolla white; fruit globose-pyriform brown.—*G. H.*

Mole, The Common. By Theo. H. Scheffer (*U.S.A. Exp. Stn. Kansas, Bull.* 168; illustrated).—An interesting account of the life and habits of the common mole (*Scalops aquaticus*). The author recommends trapping as the surest means of getting rid of moles, although poisoning with strychnia sulphate is frequently practised with good results. Raisins poisoned by removing the seeds and inserting crystals of strychnia have also proved effective when placed in the runways.—*V. G. J.*

Mosquitoes, Preventive and Remedial Work against. By L. O. Howard, Ph.D., (*U.S.A. Dep. Agr. Bur. Entom., Bull.* 88; June 20, 1910).—An interesting account of the crusade against mosquitos and malaria, which is being carried on vigorously in many parts of the world.

The chief methods of extermination and prevention are: (1) the draining of all marsh lands, especially salt marshes (the land thus drained and reclaimed can in most cases be made agriculturally useful). (2) abolition of accidental breeding places, such as surface water, rubbish heaps where water may accumulate, and catch basins in sewers; (3) encouragement of certain natural enemies of the mosquito, *i.e.*, gold-fish, minnows, stickle backs, and dragon-flies; (4) the application of a surface film of low-grade fuel oil, kerosene, or petroleum on tanks, ponds, or any water that is known or suspected as a breeding place. The writer considerably includes in the bulletin remedies for those who are unfortunately bitten; these are glycerine, soap, naphthaline moth-balls, and a liniment composed of 30 grains of iodine to 1 oz. of saponated petroleum, all of which have proved efficacious.—*V. G. J.*

Nectarine 'President Viger.' By Pierre Passy (*Rev. Hort.* October 16, 1910; p. 76; coloured plate).—Raised by M. A. Chevreau, Montreuil, from a stone of a clingstone nectarine received from the Cape, and sown owing to the brilliant colouring of the fruit. The result is a much improved freestone nectarine of robust character and easy culture and very handsome.—*C. T. D.*

Neoglaziovia concolor (*Bot. Mag.* tab. 8348).—Nat. ord. *Bromeliaceae*; tribe *Billbergieae*. Brazil. Herb, stem very short; leaves 5-8, linear white lepidote, $1\frac{1}{2}$ -2 feet long, 1 inch wide; raceme terminal; peduncle white woolly; perianth, calyx, scarlet; petals violet.—*G. H.*

Nicotiana, hybrid (*Tabaca* \times *sylvestris* var. 'Madame Maurice Granel.') By D. Bois (*Rev. Hort.* September 1, 1910; p. 397; one illustration).—As a result of crossing these two species one plant of the second generation has assumed a remarkably robust growth, about 7 feet high, with huge leaves and large white flowers, and has stood several winters in the open, merely mulched with leaves. The photo-

graph shows a fine specimen well adapted as a bold ornamental plant of fine habit.—C. T. D.

Nitrogen Fixation in Colorado Soils. By W. P. Headden (*U.S.A. Exp. Stn., Colorado, Bull.* 155; February 1910; 8 plates).—In this State complaints have been common that notwithstanding the raising of the standard of agricultural practice results have not been so good as formerly, and an impetus was given to the scientific investigation of the cause by the sudden death of a large portion of an established orchard in the early summer of 1909 (p. 5). The trouble first showed itself as a scorching of the tips of the leaves, which spread over the whole leaves and killed them and in many cases the whole tree, as many as 200 trees dying in a single orchard during the summer. This occurred in several sections of the State and on all kinds of soils, some of the trees being as much as twenty-seven years old. There was only one thing common in all cases, and that was the brown colour of the surface soil (p. 6). Complaints of "brown spots" on which nothing would grow have been common for many years, and they are often erroneously called "black alkali spots" locally. There is no doubt they are becoming more common, and though at first they were reasonably called "spots" by comparison with the area of the land, they are now often several acres in extent and may be regarded as an outward and extreme manifestation of a condition of things which is becoming very common. Sometimes the affected areas are shining in appearance as if wet or oily, though in reality dry; sometimes there is an incrustation of the surface soil, while underneath, to a depth of an inch, or even as much as three inches, the soil is of a mealy character and contains crystals which glisten when the surface is turned over with the foot (p. 18).

Analysis of the soil of affected areas show them all to possess excessive quantities of sodic nitrate—as much as 6.54 per cent. in an air-dried sample from the top inch of an area of some eight or ten acres, and 5.62 per cent. in a similar sample from two inches of the surface of a smaller area, while a sample taken to the depth of a foot contained 2.83 per cent. of sodic nitrate, equal to 56 tons to the acre in the first twelve inches (p. 48).

The question of the source of these vast stores of nitrate is being investigated, but much preliminary work has been done and the author has no doubt that they have been, and are being, obtained from the atmosphere by the nitrogen-fixing bacteria present in the soil. The explanation of the sudden dying of established orchard trees is that the accumulation of nitrates in the surface soil was carried down to the roots by a fall of rain at the time when they were most active (p. 44), trees having been experimentally killed in exactly similar fashion by the application of heavy doses of nitrate of soda. There are several things common to these infected areas (p. 45). They are all so situated that while moisture is not excessive there is an adequate supply of it. The surrounding soils are almost uniformly poor in nitrogenous matter and

rich in carbonate of lime, and in places where there is a comparatively even high temperature for goodly periods at a time. The bacterial flora, which is able to fix nitrogen from the air, is of very wide distribution in the Colorado soils, and it is thought that with a combination of such favourable conditions as these they develop so vigorously as to produce the effects recorded.

It is suggested that the nitrates of Chile and Peru may have had to similar origin.—A. P.

Nitrogen Fixation in Colorado Soils. By W. P. Headden (*U.S.A. Exp. Stn., Colorado, Bull.* 160; May 1910).—This deals further with the investigations which formed the subject of Bulletin 155 (see above), and confirms the conclusions advanced there. It has been found that one species of the nitrogen-fixing germ, which is very common locally, produces a brown pigment, while nitrate of soda applied to the soil in large quantities produces the same mealiness of condition which is one of the distinguishing features of the "brown spots."—A. P.

Nut Culture. By B. C. J. Lewis (*U.S.A. Agr. Exp. Stn., Oregon, Circ.* 3; 1908).—Some notes on the propagation and general cultivation of walnuts, filberts, and almonds in the State of Oregon, where walnut-growing is said to be becoming an important industry. The soft-shell type of walnut such as the 'Santa Barbara' is said to bloom too early to avoid the late frosts in Oregon, where the hard shell or French type is the most suitable to grow.—M. L. H.

Nuts, Snout Beetles that injure. By F. E. Brooks (*U.S.A. Exp. Stn., W. Va., Bull.* 128; March 1910, 6 plates, 8 figs.)—The forests of West Virginia are rich in nut-bearing trees and shrubs, 40 to 75 tons of chestnuts being marketed by several counties during favourable seasons. Almost all varieties of nuts are attacked by the larvæ or grubs of over a dozen different species of snout beetle, frequently 50 per cent. of chestnuts kept for a week or so after gathering become "wormy." These infested nuts are unfit for food, and do not germinate when planted. With a few exceptions the beetles issue from the earth in July and August, and eggs are laid in the nuts and hatch in one or two weeks, the larvæ feeding on the kernels. When full grown they leave the nuts through round holes that they bore in the shells, and enter the soil where they make a small cell in which to pass the winter months. In June, July and August they change to pupæ, and after a short time transform to the adult stage.

Several methods of control are suggested by the author, but spring and summer cultivation of the soil to destroy the cells, and burning the infested nuts are among the most practicable, the pests being difficult to deal with on account of their habits of feeding.—V. G. J.

Oaks, Mildew in (*Jour. Soc. Nat. Hort. Fr.; Ser.* 4; vol. xi. p. 587; October 1910).—A fungoid disease of the oak called here *Oidium*, or *Blanc du Chêne*, had during 1907 and 1908 spread rapidly

in Europe and N. Africa, and was beginning to attain disquieting proportions. It has suddenly subsided, however, through the attack of another fungus of the genus *Cicinnobulus* which has increased under the influence of the same climatic conditions which favoured the growth of the *Oidium* and which apparently destroys this last pest by attaching itself to its mycelium and conidia.—M. L. H.

Orchard Mites, Two Common. By George P. Weldon (U.S.A. *Exp. Stn., Colorado, Bull.* 152; October 1909; 7 figs.).—This bulletin deals with the brown mite (*Bryobia pratensis* Garman), and the red spider (*Tetranychus bimaculatus* Harvey). The brown mite does not confine its attention to fruit trees, having been first noticed as a clover pest.

After many experiments with tobacco and other sprays, the author has come to the conclusion that flowers of sulphur, 1 lb. to 3 gallons water, with sufficient soap to make the mixture adhesive, is a perfectly effective remedy for both pests when used as a summer spray.

V. G. J.

Oyster-shell scale, and the Scurvy Scale, The. By . A. L. Quaintance (U.S.A. *Dep. Agr. Bur. Entom., Circ.* 121; April 30, 1910; 2 figs.).—The Oyster-shell scale (*Lepidosaphes ulmi* L.) and the scurvy scale (*Chionaspis furfura* Fitch) are, with the exception of the San José scale (*Aspidiotus perniciosus* Comst.), more frequently the subject of inquiry by orchardists than all other scale insects combined, and are often mistaken for the more serious San José scale.

The oyster-shell scale is the more important of the two, but while it is unusual for either species to actually kill a tree, inestimable damage may be done by stunting and retarding the growth. It has a wide range of food plants, but is commonly found on the apple, maple, poplar, horse-chestnut, willow, and lilac. The adult female scales resemble a long narrow oyster shell, about one-eighth of an inch long, grey, brown, or dark brown in colour. The male resembles the female scale in colour and shape, but is smaller and possesses at the posterior extremity, a small flap or hinge which permits the exit of the adult male.

The scurvy scale is a native of North America, and occurs principally on rosaceous plants and also on currants and gooseberries, but is seldom abundant enough to cause injury or require treatment.

The female scale is dirty grey in colour, and irregularly pear-shaped, the male scales being much smaller, elongate, snowy white, with three distinct keels extending along the back.

In orchards well sprayed for San José scale, during the dormant period, these two pests will rarely prove troublesome. Preparatory to spraying, however, the trees should be carefully pruned, and any dead and weakened wood cut out.—V. G. J.

Palestine, Agricultural and Botanical Explorations in. By Aaron Aaronsohn (U.S.A. *Dep. Agr., Bur. Pl. Ind., Bull.* N. 180;

August 1910; plates).—The author is well known for his discovery on Mount Hermon of a wild emmer from which our cultivated types of wheat and related cereals seem to have been derived.

This bulletin calls attention to the similarity in general topography, climate, vegetation, and agricultural and economic possibilities between Palestine and the State of California, and gives a long list of economic plants and of fruit trees which might profitably be introduced from Palestine into California, either to serve as stocks or as useful new varieties.

He then gives an account of the circumstances which led up to his finding the wild emmer (*Triticum dicoccum dicoccoides*). The cultivation of some form of wheat began long before the dawn of history, and it was only in the nineteenth century that the question of an original ancestor of our cultivated varieties began to be scientifically considered. Even then, after the abandonment of several untenable theories, the conclusion was come to for a time that while *Hordeum spontaneum* was the original wild form of barley, and *Secale montanum* was the prototype of cultivated rye, the genealogical record of wheat had disappeared for ever and that its life history could be written only hypothetically.

Wheats have been classified as follows:—

In the section Eutriticum there are three species, *Triticum monococcum* (einkorn) *Trit. polonicum* (Polish wheat) and, thirdly, a collective species *Triticum sativum*. *Triticum sativum* is divided into three small species:—

T. dicoccum (emmer),

T. Spelta (spelt),

T. tenax (common wheats).

Of these *T. tenax* is subdivided into sub-species:

T. vulgare (wheat),

T. compactum (short-eared wheat),

T. turgidum (Poulard wheat),

T. durum (durum wheat).

This classification is essentially artificial and the distinction between the groups is very difficult to maintain. The behaviour of crosses and hybrids also indicates a very close relationship among the so-called species, *T. monococcum* alone refusing to hybridize with the rest. The others pass so gradually into one another that it seems more than probable that all existing wheats belong really to one species. When we come to the consideration of what the original prototype of our wheat must have been, there are certain characters whose existence we may pre-suppose. Among these is undoubtedly a fragile rachis. All who have studied the question agree that a rigid rachis is an acquired characteristic developed by man, and has a tendency to destroy the plant's natural capacity to disseminate itself. Again, it would be needful that the grain in its wild state should remain fixed in its glumes as a general protection against premature germination, decay, and destruction by enemies, while this is a peculiarity which makes the grain trouble-

some to harvest, and prevents thrashing by flails, and which man set himself first to overcome, until naked grains and a rigid rachis have become the rule and cultivated wheat is incapable of perpetuating itself without the intervention of man. Among cultivated wheats there are still three which retain the brittle rachis, einkorn, emmer, and spelt. Of these there seem sufficient botanical or historical reasons for rejecting two—einkorn and spelt—as the progenitors of cultivated wheats, while emmer is the species of grain of which we have the oldest records. Durum wheat has been found in Egypt in some tombs of the first dynasty, that is about B.C. 4000, but emmer, though it has entirely given place to durum wheat in Egypt to-day, is found in far greater abundance and in all the tombs. It has been found in the lake dwellings of Wangen and Robenhausen which date back to the end of the neolithic epoch, and is thus the only species which has been cultivated from the very beginning of civilization. We are therefore justified in asserting it to be the progenitor of our cultivated wheat and in considering it so desirable to find the emmer in its wild form. In 1873 Körnicke discovered among stems of *Hordeum spontaneum* in the herbarium of the National Museum of Vienna, gathered on Mount Hermon, part of an ear of a graminiferous plant which he considered to be a wild wheat and which resembled the emmer. With unaccountable forgetfulness he did not speak of this discovery in the work on cereals he was then preparing, and it was only much later that he reported it and vainly urged all botanists who went into the neighbourhood of Mount Hermon, and the Academies of Vienna and Berlin to turn their attention to this subject. In 1904, however, Mr. Aaronsohn was in Upper Galilee and made a special unsuccessful expedition to Mount Hermon to search for this emmer which had definitely taken the name of *Tritrium dicoccum dicoccoides*. In 1906 he again went to Upper Galilee on the same errand and this time in the vineyard of the Jewish Agricultural Colony at Rosh Pinar, at the foot of Jebel Safed, he discovered the plant for which he was seeking in a crevice of a rock of nummulitic limestone. Still other expeditions resulted in the discovery of an astounding number of forms of *T. dicoccum dicoccoides* not only in the neighbourhood of Mount Hermon but all over the countries of Moab and Gilead. Mr. Aaronsohn also gathered a plant of wild rye, *Secale montanum*, which had always hitherto been said not to belong to the East at all. His researches further revealed the wide range of *T. dicoccum dicoccoides* which is always found in company with *Hordeum spontaneum*, and which apparently grows only in crevices of rocks where there is only a thin layer of soil, in the most arid situations and fully exposed to the sun. The only formation in which it does not thrive seem to be the Senonian rocks and the Nari conglomerate. All the facts and details collected by the author seem to him to prove conclusively that this *Triticum* was undoubtedly the prototype of all cultivated wheats and that the cultivation of cereals must have originated in Syria and Palestine, or in closely adjoining localities, where in some parts the hills are sown so thick with emmer and wild

barley that they look like fields of unweeded crops, and where prehistoric man was in consequence not so exclusively a hunter and shepherd as he has been represented, but learned probably at a very early period to gather and preserve grain. He also considers that the fact that *T. dicoccum dicoccoides* endures the most extreme climatic conditions points to an important economic future for the plant as the possible parent to a race of wheats fit for the needs of many semi-arid regions of all four continents where at present no wheat will grow, and it may so increase materially the world's supply of food.—*M. L. H.*

Parasites of Gipsy Moth (II.), Description of Certain Chalci-doid. By J. C. Crawford (*U.S.A. Dep. Agr. Bur. Entom., Tech. ser.* 19, Part II.; April 30, 1910; 16 figs.).—Technical results from the Gipsy Moth Parasite Laboratory. The new species described in this paper came from material imported from Japan and Europe for the purpose of rearing parasites of the gipsy moth and brown tail moth.—*V. G. J.*

Parasitic Fungi, Researches on the Life-history of. By C. K. Bancroft (*Ann. Bot.* xxiv. April 1910, pp. 359-371; 1 plate).—In the first of this series of investigations the author gives an account of artificial cultures and infection experiments with *Cladosporium herbarum*. He shows that the life-cycle is composed of two conidial forms—one a parasitic form, *Hormodendron*, and the other a saprophytic form, *Cladosporium*. Each form is capable of giving rise to the other, and the life-cycle appears to be complete without the intervention of an ascigerous stage. The *Hormodendron* is a summer form which may produce disease on the leaves of several species of plants. When the leaves die the *Cladosporium* form develops. The plants employed were *Brassica oleracea*, *Cucumis* spp. *Arctium Lappa*, *Catalpa bignonioides*, *Althaea*, *Malva*, *Circaeo*, *Funkia*, *Phlox*, and *Digitalis*, all of which were readily infected by *Hormodendron*. Conidia of *Cladosporium*, when placed on living leaves, give rise to conidia of *Hormodendron*; direct infection of living leaves by *Cladosporium* was not obtained.

In artificial cultures *Cladosporium* was found to give rise to *Hormodendron* if the temperature was moderately high, but at a lower temperature it reproduced itself. In winter *Cladosporium* exists in the form of microsclerotia, which on the advent of spring germinate and give rise to *Cladosporium* spores. The latter on germination give rise to conidia of *Hormodendron*.

The author shows that *C. herbarum* Link and *C. epiphyllum* Nees are one and the same plant, and gives a full list of synonymy.

A. D. C.

Philadelphus 'Virginal.' By G. T. Grignan (*Rev. Hort.* September 1, 1910, pp. 407-9; two illustrations).—Depicting young and adult plants of this variety, the latter a large shrub bearing a dense enveloping mass of large rose-like double white flowers. Raised by

MM. Lemoine. A number of other forms are also described as of great beauty, but this is one of the élite.—*C. T. D.*

Phlox 'Comtesse de Jarnac,' A variegated. By Georges Bellair (*Rev. Hort.* October 1, 1910, pp. 449-50; 1 illustration).—Described as a very finely variegated form, the leaves being broadly margined with pure white and in the vicinity of the inflorescence entirely white, presenting a very good effect. The flowers are poor, and it is advised to disbud entirely to encourage the foliage effects. Propagated by buds from least variegated parts or by root division.—*C. T. D.*

Phosphate Fields of Idaho, Utah, and Wyoming. By W. H. Wagaman (*U.S.A. Dep. Agr., Bur. Soils, Bull.* 69; June 1910; 12 tables and map).—These States contain one of the largest phosphate areas at present known, the beds being thick and readily workable, and of high quality. As phosphate rock is considered to be one of the natural resources which is apparently being most rapidly depleted, some 6,700 square miles of the public domain which are considered to include the most valuable of these deposits have been withdrawn from all form of entry, and two geological Survey parties were engaged upon them in 1909, this bulletin containing the results of the work in the matter of sampling and analysing the phosphate rock (p. 8).

The deposits are interstratified with limestones and quartzites, and are considered to be original sedimentary deposits laid down at a time when this part of the earth's surface was submerged. Following the deposition of these beds other deposits were similarly formed to a thickness of many thousands of feet, and subsequent deformation of the earth's crust folded and broke the originally flat-lying strata. The total thickness of the strata in which the phosphate occurs is generally not greater than 200 feet (p. 10).

The tables show the phosphoric acid content of numerous samples of rock with information as to strike, dip, etc. Many samples have been found to contain from 36 to 38 per cent. of phosphoric acid, equal to 79 to 83 per cent. of tricalcic phosphate, showing them to be of about the same richness as apatite and Florida phosphate (p. 46).

The author thinks there is little prospect that the western phosphates will be extensively mined in the near future owing to the great distances to present markets, but that with the growing demand in the West for fertilizers, and the gradual depletion of the more accessible deposits, they will come more and more into prominence. Mining rights should be granted with the utmost care, and with such control as to prevent wanton waste of lower grade deposits, which, though not at present of value, are likely to be so in the future.—*A. P.*

Pineapple Culture (VI.). By A. W. Blair and R. N. Wilson (*U.S.A. Agr. Exp. Stn., Florida, Bull.* 101; January 1910).—These experiments were undertaken to decide whether the quality of pineapples is affected by quantity and quality of the fertilizer used.

It was found that increased fertilizer produced more large-sized

fruits up to a certain point, though the total number was not materially increased, and certain fertilizers (as acid phosphate without lime) have a decidedly deleterious effect upon the plants and lessen the quantity of fruit produced.

Increasing the fertilizer slightly increases the sugar content, and very slightly decreases the acid.

Large fruits contain more sugar than small and less acid.—*C. H. L.*

Pineapples, Experiments on Preparation of Sugared, Dried.

By H. C. Gore (*U.S.A. Dep. Agr., Bur. Chem., Circ. 57; May 1910*). The principal fact deduced from these experiments is that sliced pineapples, when dried and sugared, yield a very palatable product of fine-keeping quality. Sliced pineapples allowed to stand in contact with sugar form much syrup. It is therefore better to allow partly dried slices to stand in contact with about 12 per cent. of their weight of sugar for six to eighteen hours. The slices are then re-dried until fairly firm but still sticky.

The Red Spanish variety darkens with keeping more than the Smooth Cayenne. This can be to some extent prevented by cold storage.—*C. H. L.*

Pinus Armandii (*Bot. Mag. tab. 8347*).—Nat. ord. *Coniferae*; tribe *Abietineae*. S.-W. China. Tree, 60 feet high; leaves in tufts of fives, slender, 4-6 inches long, under $\frac{1}{2}$ -line wide; male catkins cylindric, yellow cones, obtuse, 4-7 inches long, scales rhomboid, the tip recurved.—*G. H.*

Plant Culture under Calico. By W. J. Belderson (*Gard. Mag.*, No. 2945, April 9, 1910, pp. 283).—The writer explains in detail how calico stretched over a framework of wood can be used in a variety of ways in a garden.

Chrysanthemums are grown under such structures with great success, the erections being placed over the plants as they grow in beds.

In spring calico-houses are used for half-hardy seedlings and pricking out, affording protection from frost, cutting winds, and heavy rain. Beds of bulbs can be forced with great success.—*E. B.*

Plant Diseases, Notes on New York (I.) By F. C. Stewart (*U.S.A. Exp. Stn., New York, Bull. 328; December 1910; figs.*).—A large number of plant diseases are briefly referred to in this bulletin, including the following of horticultural interest.

Apple.—Bitter rot, *Glomerella rufomaculans*, is of no economic importance in New York, statements to the contrary being erroneous.

Crown Gall, *Bacterium tumefaciens*, is common, but in twelve years' experience the author has never seen or known of a well-authenticated instance of crown gall injuring an apple.

Leaf spot is frequent, but the authors appear to regard the fungus,

Sphaeropsis malorum, which rarely fruits on living apple leaves in New York, as only one of the causes.

Myxosporium canker, formerly attributed to *Macrophoma malorum*, should be described under the name *Myxosporium corticolum*, which also occurs on dead pear bark.

Scab, *Venturia inaequalis*, is frequently, in the opinion of the author, indirectly the cause of spray injury, for the cuticle is ruptured by the fungus, and the poisonous compound thus reaches the delicate underlying cells. Baldwins were more affected than Greenings, Russets least of all.

Rust, caused by *Gymnosporangium macropus*, is rarely injurious to apples, though it is common on the alternative host, *Juniperus virginiana*. It is occasionally troublesome, and 'Wealthy,' 'Boiken,' and 'Rome' have been found more susceptible than 'Hubbardston' and 'Sutton,' while 'McIntosh,' 'Yellow Transparent,' 'Gravenstein,' 'Red Astrachan,' and 'Oldenburgh' were practically immune. Bordeaux mixture checked the disease.

Mildew has been found to be due, as in England, exclusively to *Podosphaera leucotricha*, and the occurrence of perithecia as early as the end of June is reported. 'Black Ben Davis' and 'Chenango' are particularly susceptible.

Sphaerostilbe coccophila Tul. is reported as growing parasitically on San José scale, and doing much to keep it in check in an orchard on Long Island. This fungus does not appear to be an effective check on the scale except in Florida, climatic conditions so far north being usually against it.

Asparagus.—Rust, *Puccinia asparagi*, is very prevalent, but it is reported that spraying with Bordeaux mixture is very profitable.

French bean.—The occurrence of a mildew, probably *Erysiphe polygoni*, is reported.

Beech.—*Fomes igniarius*, *F. fomentarius* and *F. pinicola*, causing decay of the wood, are reported.

Beet.—*Cercospora helicola* is a very common cause of a destructive leaf spot on beets in New York, and the evidence suggests the probability of its being carried in the 'seeds.' *Phyllosticta betae* has occurred once.

Begonia.—A mildew (unidentified) and an attack of eelworm are reported.

Blackberry.—Rust, *Gymnagonia Peckiana*, is a pest of blackberries and black raspberries; *Kuehneola albida* also occurs.

Blueberry.—Witch's broom on *Vaccinium corymbosum*, caused by *Calyptospora Goeppertiana* on Long Island is reported.

Box.—The failure to root of some box cuttings was found to be associated with the presence of a fungus, *Phoma stictica*.

Brussels sprouts were attacked by *Plasmiodiophora brassicae*, but this disease does not appear to be very common.

Cedar.—The rust, *Gymnosporangium nidus-avis*, which has as

alternative host *Amelanchier canadensis*, brings about reversion to the juvenile form of foliage when it attacks *Juniperus virginiana*.

Cherry.—*Sclerotinia fructigena* (= *Monilia fructigena*) is reported killing shoots of Morello and other cherries, and *S. seaveri* (= *Oidium destruens* and (?) *Monilia Linhartiana*) those of the black cherry (*Prunus serotina*). Witches' brooms, due to *Exoascus cerasi*, occur occasionally, but rarely spread. The mildew, *Podosphaera oxycanthae*, is destructive to cherries, but the Mahaleb and 'Governor Wood,' appear to be immune. *Cylindrosporium padi* attacks green fruits of *Prunus virginiana* as well as leaves, and is similar to the disease prevalent in Europe on *Prunus Padus*, ascribed to *C. Tubeufianum*.

Chestnut.—A canker due to the wound parasite, *Valsonectria parasitica*, on sweet chestnut occurred at Hicksville.

Coreopsis tinctoria was attacked by *Erysiphe cichoracearum*, as was *Cosmos bipinnatus*. The latter plant is also frequently attacked by *Phomopsis Stewartii*, producing stem blight in mature plants. The appearance of the disease is described and a technical description of the fungus given. Inoculation experiments rarely succeeded.

Pemphigus populicaulis and *P. populi-transversus*, forming galls on petioles of *Populus deltoides*, are recorded.

Cucumber is reported attacked by *Erysiphe cichoracearum*, as is *Dahlia*.

Hepatica.—A destructive parasite, *Plasmopara pygmaea*, was apparently kept in check by Bordeaux mixture; it is thought that the fungus is perpetuated both by perennial mycelium and by oospores.

Hollyhock.—The association of *Septoria parasitica* Fautrey, and *Ascochyta parasitica* with *Puccinia malvacearum* is noted.

Honeysuckle.—*Microsphaera alni* var. *lonicerae* is reported on *Lonicera tatarica* for the first time in America, the yellow-fruited plant being apparently more susceptible than the red.

Hop.—Leaf spot, *Cylindrosporium humuli*, occasionally occurred, and an outbreak of the mildew, *Sphaerotheca humuli*, which does not seem so far to have become a pest of great economic importance as it is in England.

Horse-chestnut.—The appearance of ragged leaves on this and Maple through injury wrought by frost is described, and the death of a large tree is ascribed to *Collybia velutipes* occurring as a wound parasite.

Ampelopsis tricuspidata was attacked by the pycnidial form of *Guignardia Bidwellii* (= *Phyllosticta labruscae*).

Belamcanda chinensis was badly attacked by *Heterosporium gracile*.

Maple.—The leaves of *Acer platanoides* were caused to fall prematurely through the attacks of aphides. This maple is rarely attacked by *Rhytisma acerinum* in Long Island, but *A. saccharinum* suffers severely. *A. Pseudoplatanus* also appears to escape.

Melon.—*Septoria cucurbitacearum* occurs occasionally on muskmelons and on other cucurbitaceous plants.

Tropaeolum majus was found to be attacked by the white rust, *Cystopus candidus*, so very common on leaves of cruciferous plants.

Peach.—A remarkable case of the falling of peach leaves while young and green is referred to, and a severe attack of *Sphaerotheca pannosa* in June is reported.

Pear.—The crimson coloration of pear leaves in autumn in an orchard at Geneva is ascribed to unthriftness in the trees. A case of oedema in trees stored in a house is described at length, apple, peach, plum and cherry stored in the same house being also affected. No cause could be assigned. Rust, due to *Gymnosporangium globosum*, occurs occasionally, some varieties being apparently less susceptible than others. In one orchard considerable loss of grafted pears has occurred through the death of the stocks, which is thought to be due to the attack of *Sphaeropsis malorum*, but the evidence does not appear very conclusive.

Pelargonium peltatum suffered from oedema in a warm, very moist house.

Phlox was attacked by a species of *Cercospora* to which the name of *C. phlogina* Peck has been given. It produces circular brown spots on the foliage, which on the upper surface show a dark brown border. *Erysiphe cichoracearum* is also recorded on phlox.

Plum.—The "knots" caused by *Plowrightia morbosa* are often overgrown by the saprophyte, *Trichothecium roseum*, and sometimes by *Sporotrichum parasiticum*. *Sclerotinia fructigena* is a frequent cause of the death of twigs and small branches in both ordinary and Japanese plums. In several cases infection had evidently been through the flower stems, and had proceeded down the shoots into the main stems, where cankerous spots, with exudation of gum, had been produced.

Callirhoë involucrata was badly attacked by *Aecidium tuberculatum*, which is perhaps perennial in the tissues of its host. No alternate host is known.

Potato.—The author appears to consider *Rhizoctonia* (*Corticium vagum* var. *solani*) as doubtfully the cause of damage to potatoes, though it frequently occurs upon them. Radishes, however, were found to be dying through the attacks of a *Rhizoctonia* near the surface of the soil, and pure cultures of the fungus from, *Actinidia polygama*, *Lactuca Scariola*, *Impatiens* sp., cabbage and lettuce were found to be infective to radishes.

Quince.—The rust, *Gymnosporangium clavipes*, is sometimes frequent upon the quince.

Rubus.—A blight of raspberries due to *Leptosphaeria Coniothyrium* is described, and by cultural experiments the author has demonstrated the fact that, as suspected, *Coniothyrium Fuckelii* is a stage in the life-history of this fungus. Black patches are produced on the canes, and the disease is very destructive. *Botrytis putula* is occa-

sionally found on the canes, but the author believes it to be merely a saprophyte following the death of the canes caused by *Leptosphaeria*.

Rose.—The production on the leaves of plants in houses of reddish or purplish spots, later becoming brown with a purple border, was found to be due to *Mycosphaerella rosigena*. It is not often a serious disease. Mildew, *Sphaerotheca pannosa*, was found to produce perithecia on both surfaces of the leaves of roses.

Snowberry (*Symphoricarpos racemosus*) had its leaves and berries much disfigured by the attack of a species of *Gloeosporium*, but the growth of the bushes was but little affected.

Sweet Pea.—Mildew (*Erysiphe* sp.) is reported on the sweet pea, but no perithecia could be discovered.

Vinca major variegata was attacked near the surface of the soil by a species of *Phoma*, and the death of the shoots followed.—F. J. C.

Plant Louse Notes. By C. P. Gillette (*Jour. Econ. Entom.* vol. 2, pt. 6, pp. 385-388, December 1910).—Notes on several species of Aphididae with figures of antennae, &c.—F. J. C.

Platyserium. By H. Poisson (*Rev. Hort.* October 1, 1910, pp. 458-60, and November 16, 1910; p. 530; one illustration).—An interesting article on this curious genus of ferns, with names and descriptions of fifteen different species: *P. aethiopicum*, *P. alcicorne*, *P. andinum*, *P. angolense*, *P. bifforme*, *P. Ellisii*, *P. sumbawensi*, *P. grande*, *P. Veitchii*, *P. Wallichii*, *P. Wandae*, *P. Willinckii*, *P. madagascarense*, *P. Vassei*, and *P. Wilhelminae Reginae*.—C. T. D.

Pleiocarpa mutica (*Bot. Mag.* tab. 8343).—Nat. ord. *Apocynaceae*; tribe *Plumerioideae*. West Africa. Shrub 5 ft. high; leaves 3-6 inches long; flowers in axillary, many-flowered, globose clusters; corolla pure white, $\frac{1}{2}$ inch across the limb.—G.H.

Pollination, Studies for the Students of. By C. H. Lewis (*Better Fruit*, May 1911, pp. 79-85).—The emasculation of the flowers must be done before the blossoms open. The blossoms should be carefully covered with paper bags until fecundation has taken place. Pollen can be obtained by picking the twigs a little early and placing them in fruit jars in a warm place. The anthers can soon after be gathered and placed in a dish in a warm room, and after ripening the pollen can be collected. A little camel's hair brush is as good as anything to use in transferring the pollen. Very little pollen of either the apple or the pear is transferred by air currents. The chief agent in pollination work is the bee, which is attracted by the bright coloured petals, if these are removed few bees are attracted to the tree. Thus on one tree the petals were removed from 1,500 blossoms, but only five apples set, very few bees visited the tree. The aim has been to find the cause of sterility. Eighty-seven varieties of apples were tested to ascertain which were self-fertile and which self-sterile; of these fifty-seven proved sterile, including 'King of Tompkins County,' 'Gravenstein,' 'Dutch Mignonne,' 'Twenty Ounce,' and 'Wealthy'; fifteen varieties showed

themselves self-fertile including 'Baldwin,' 'Grimes' Golden,' 'Keswick Codlin,' 'Duchess of Oldenburg,' 'Washington,' and 'Yellow Newtown'; and thirteen varieties were partially self-fertile including 'Ben Davis,' 'Spitzenberg,' 'Wagener,' and 'Yellow Transparent.' The record gives the number of bags used on each variety, the number of fruits set when hand pollinated, the number set in bags not hand pollinated, the total number of fruits set, and a description of each variety as a pollen bearer, whether shy, medium or abundant. If a variety is fertile it does not seem to set many more fruits when bagged and hand pollinated than when bagged and left untouched. Next they have worked to find the best pollinizers for the sterile or nearly sterile varieties.

Again as to whether varieties could be improved by crossing. Thus 'White Winter Pearmain' has been found to give very successful results with the 'Newtown' and other varieties. The seedlings from the 'White Winter Pearmain' are strong and sturdy, whereas 'Ben Davis,' of poor vitality, is a poor male parent—its crosses seem to be lacking in vitality.

Many of the flat apples seem to have a poor influence in crossing, as 'Maiden's Blush.' 'Northern Spy' has proved a good pollinizer. In most cases no very marked results in the colouring of the apple by crossing has been shown; but vegetative vigour is greatly influenced, thus the number of seeds that are set influences the weight of the fruit, and the pollen used influences the foliage, size and form of fruit of the seedling. In planting varieties for pollination attention must be paid to the time of blooming. List follows of early bloomers including 'Duchess of Oldenburg,' 'Red Astrachan,' and 'Wealthy,' and of late bloomers including 'King of Tompkins' County,' 'Keswick Codlin,' 'Twenty Ounce,' 'Washington,' and 'Wagener.' Planting four to six rows of a variety is recommended as better than alternating varieties as it costs less to spray and pick, &c.

The flower buds are formed by the end of August as they then show the fruit blossoms already formed in the bud.

As to thinning, in pears and apples, allow only two specimens to a fruit spur, this allows formation of fruit buds for the next year. Severe summer pruning previous to middle of July turned fruit buds into leaf buds, or at least fruit-bud formation was prevented, whereas light and judicious summer pruning was favourable to the production of fruit buds.

Apple flowers are receptive to pollination for a week after opening, and for scientific purposes they can be pollinated before they are entirely open.

With the pear, conditions appear to affect its fertility or sterility with its own pollen. Thus in Oregon, 'Doyenné du Comice' is the only variety which is sterile, whereas in the Eastern States, 'Williams' Bon Chrétien,' 'Winter Nelis,' and 'Beurré Bosc' are self-sterile. However, in Oregon most pears are greatly improved by cross-pollination, it has an influence in producing seed and in a strong degree changes

the form of the fruit. Especially is this true with 'Williams' Bon Chrétien,' and 'Beurré Bosc.' Certain varieties show practically no difference in size and shape of fruit regardless of the pollen used, but 'Howell' and 'Winter Nelis' are not of this class; some varieties are injured by this process. Thus 'Beurré Bosc' should not be crossed with 'Williams' Bon Chrétien,' as the fruit so crossed is apt to be small and misshapen, but when crossed with 'Doyenné du Comice' it is large and fine. Concerning the best combinations of pears to plant, when 'Williams' Bon Chrétien' and 'Beurré d'Anjou' are planted together they both fruit well, also 'Winter Nelis' and 'Doyenné du Comice' make a splendid combination. The pollen of any variety suits 'Howell' and 'Beurré Bosc,' but not every variety suits 'Williams' Bon Chrétien.' It is suggested that in planting a pear orchard the best plan would be to set from four to six rows in the following order: 'Williams' Bon Chrétien,' 'Beurré d'Anjou,' 'Winter Nelis,' 'Beurré Bosc,' and 'Howell.'—C. H. H.

Potato Plant in Ireland, A Bacterial Disease of the. By Dr. G. H. Pethybridge and P. A. Murphy (*Proc. Roy. Irish Acad.* xxix. (1911) B. 1, February 6, 1911; plates).—After a review of the history of the bacterial diseases of the potato, the authors describe the disease which is similar to "black-leg," under the better name of "black stalk-rot." The disease appears early in the season and plants affected are characterized by the lighter colour of their foliage which is occasionally spotted, and exhibits some amount of "leaf-roll." The underground part of the stem is wholly or partly decayed, leaving only the vascular bundles, or if partly decayed the tissues appear black. The parent 'set' is wholly decayed only the stalk remaining. In cutting diseased stalks transversely they will be found to be tough and their bundles discoloured. The diseased tissues teem with bacteria.

Attempts to isolate the organism have been successful, and its cultural characteristics have been studied and are described. It is a rod-shaped bacterium 1.3μ to $1.8 \mu \times 0.9 \mu$ forming chains, and motile having one to five peritrichous flagella. It liquefies gelatin forming greyish colonies, and growing well on most culture media.

When inoculated into the tuber (as it may be naturally) a cavity is produced containing a light brown pulp generally marked off from the healthy tissue by a distinct black line. The organism may pass into the vascular bundles which then become dark, but occasionally the pulp remains almost pure white. The pulp is at first amphoteric in reaction but the acidity is more strongly marked than the alkalinity. On exposure to air, however, it becomes markedly alkaline.

The organism is nearly allied to *Bacillus phytophthorus* and the authors suggest the name *B. melanogenes* for it.

The disease is probably contracted in the soil, but the planting of affected sets is mainly responsible for the spread of the disease. Considerable loss is sustained in the growing crop, but more in the stored potatoes. All affected plants should be destroyed, diseased tubers should

be excluded from the pits, and "seed" should be procured from localities where the disease has not appeared.—*F. J. C.*

Potato as a Truck Crop. By *I. C. Corbett* (*U.S.A. Dep. Agr. Farmers' Bull.* 407; October 1910).—Potatoes are largely grown throughout the United States. In the South two crops are often produced in a single season from Northern-grown seed. The first crop is harvested when the tubers attain a suitable size, regardless of maturity. The second crop is grown from tubers saved from the first, and produces seed which is held over towards the next season's requirements. It is important in the latter case that the tubers should not be exposed to the sun's rays, or they will not keep, and that they should be fully matured before digging.

Care should be exercised in spraying, harvesting, and grading the crop.—*C. H. L.*

Potato Crop, Considerations and Experiments on the supposed Infection of the, with the Blight Fungus (*Phytophthora infestans*) by means of Mycelium derived directly from the Planted Tubers. By *G. H. Pethybridge*. (*Sci. Proc. Roy. Dublin Soc.* xiii. (1911) pp. 12-27).—The author's investigations which are here recorded lead him to believe that the "hibernating mycelium" theory of the outbreak of attacks of potato disease is untenable. He finds that when diseased tubers are planted they:

- (1) Die before planting-time.
- (2)*Die if planted in the ground, without producing any overground stalks.
- (3) Produce small stalks above ground which soon die owing to direct infection with the fungus from the parent tuber.
- (4) Produce healthy plants, which, provided there be no opportunity during the season of becoming infected by aerially borne "spores," remain free from the disease.

Plants under experiment grown from diseased tubers when kept under conditions which render infection by spores from aerial sources practically impossible remained free from disease as did those derived from healthy tubers.

The author considers that the principal source of infection of new tubers is the spores of the fungus which fall to the ground, and this may be the only source. The mode of over-wintering of the fungus the author considers is still to be discovered.—*F. J. C.*

Potato Disease occurring in Newfoundland, A Serious. By *H. T. Güssow* (*Dep. Agr. Canada, Bull.* 63; October 1909).—The occurrence of "warty disease" of potato (*Synchytrium endobioticum*) in 1909 is recorded, and an outline of the history of the disease is given.—*F. J. C.*

Potato, On the Spongy Bodies, Spheres, and Globular Bodies present in the Cells of Bracken (*Pteris*) and. By *A. S.*

Horné, B.Sc., F.G.S. (*Centr. f. Bakt.*, Abt. II., Bd. 28, pp. 403-408; plates).—A number of curious bodies were discovered in the apices of certain rhizomes of *Pteris aquilina* similar to those seen in the potato tuber by the author. These bodies and their development are described and the author promises a further paper upon them.—F. J. C.

Potato Soils, Fertilizers for. By Milton Whitney (*U.S.A. Dep. Agr., Bur. Soils, Bull.* 65; May 1910).—Details are given of 1,769 tests of substances applied to all sorts of soils in twenty-three different States.—A. P.

Potato Spraying Experiments in 1909. By F. C. Stewart, G. T. French, S. M. McMurrin, F. A. Sirine (*U.S.A. Exp. Stn., New York, Bull.* 323; May 1910).—A series of experiments were carried out by the above station and by a number of volunteer farmers in different localities with the object of deciding as to whether or not in the long run it is profitable to spray potatoes.

This bulletin also gives the results of 8 years' potato spraying experiments beginning in 1903.

The results show without exception an increase in yield from each acre, which is often in direct proportion to the number of sprayings. In one case the increase amounted to 191 bushels the acre for 3 sprayings and 233 bushels the acre for 5 sprayings. On the other hand the expense of spraying in some cases was so great that it resulted in a loss, whereas in others the gain amounted to \$37.92 the acre.

The gain or loss in potato spraying depends on so many factors such as acreage of land cropped, current prices at the time of digging, weather, locality, &c., that the individual results vary considerably, but the average of all the experiments in 1909 taken together shows a net gain of \$9.55 the acre, and from 1903-1909 of \$16.77 the acre.

D. M. C.

Potato, Wart Disease of. By W. A. Orton and Ethel C. Field (*U.S.A. Dep. Agr. Bur. Pl. Ind., Circ.* 52; March 1910).—A new and dangerous disease (which has not yet found its way into the United States), due to a fungus belonging to the *Olpidiaceae*, the lowest group of the *Chytridiaceae*. The fungus, *Chrysophlyctis endobiotica*, causes dark warty excrescences on the tubers of the potato, uses up every particle of food stored in the tuber, and reduces it to a brownish soft mass, with an unpleasant putrefaction odour. The starch grains are the last to be attacked, and remain white and uninjured for some time in the affected cell. The parasitic plasmodium bores its way through the cell walls, and at first stimulates active division in the surrounding cells causing the characteristic galls or warts.

In the summer the plasmodium rounds itself off to form a zoosporangium inside the cell. Later the zoosporangium breaks up into numerous zoospores, which escape into the soil and infect fresh plants.

The resting zoosporangia are very numerous in the diseased tubers,

usually one, or at most two, in each cell. Infection takes place through the eyes of the tuber.—D. M. C.

Potato, Wart Disease of. By G. T. Malthouse (*Special Report, Harper Adams College, 1910; figs. and maps*).—An investigation into this disease was undertaken by the College authorities at the request and expense of Mr. Belville Stanier, M.P., and the results are here reported.

The disease which is due to the fungus *Synchytrium endobioticum* Percival was first found in Shropshire in 1901, and has since spread widely, being now found in many parts of Great Britain. The general appearance of, and damage done by, the disease have already been referred to in these abstracts. Observations convince the author that the disease continues to develop in the winter in the store. An account of the life history of the organism involved is given, and the results of attack upon stem and leaf are described. In no case was a root found to be diseased. Infection begins in May in self-set plants, but usually in July in ordinary cases. In some varieties it is most evident in the first formed tubers, in others only in those formed late in the season. Evidence is brought to show that the disease may be spread in manure from animals fed on raw, warty tubers, by infected seed, and poultry, pigs, &c., trespassing on infected soil. In Shropshire the lighter soils appear to be more liable to outbreaks than the heavier, and the disease is most prevalent in cottage gardens and allotments where there is little opportunity of changing crops.

In 1909 the varieties 'Snowdrop,' 'Southern Queen,' 'Southern Star,' 'Laird,' 'Peacemaker,' and a seedling 'Snowdrop,'* 'Pride of Tonbridge' when grown in infected soil were free from the disease, while 'Good Hope' and 'Morning Star' were slightly attacked. 'Colleen,' 'Daniel's Special,' 'Cottar,' 'Mayfield Blossom,' and 'Warrior' were badly attacked. In another series 'Conquest,' 'Abundance,' 'Golden Wonder,' 'Langworthy,' and 'What's Wanted' resisted attack. 'Eldorado,' 'Sharpe's Express,' 'May Queen,' 'Ninetyfold,' 'British Queen,' 'Royal Kidney,' 'Edward VII.,' 'Northern Star,' 'Talisman,' and 'Up-to-date' proved susceptible in varying degrees.

In 1910 fifty-seven varieties were planted, mostly in duplicate. The early varieties that proved resistant were 'Aberlady Early,'* 'Milecross Early,'* 'Snowdrop,' 'Southern Queen,' and 'Twentyfold,' second earlies 'Abundance,'* 'Conquest,'* 'Dobbie's Favourite,' and 'Supreme'; and among maincrop varieties 'Chiswick Favourite,' 'Crofter,'* 'Discovery,' 'Golden Wonder,'* 'Laird,' 'Langworthy,' 'Prolific,' 'Provost,'* 'Reading Giant,' 'Rector,' 'Schoolmaster,' 'White City,' 'Peacemaker,' and 'What's Wanted,'* Among the susceptible varieties were 'Colleen,' 'President,' 'Puritan,' 'Sharpe's Victor,' 'Sir John Llewelyn,' 'Radium,' 'Windsor Castle,' 'The Bruce,' 'Satisfaction.'

Fungicide tests were also carried out in each year, quicklime,

* Varieties marked with an asterisk were the best croppers.

sulphur, copper sulphate, sodium borate, strawsonite, and other reputed fungicides were experimented with but none proved of avail.

Raw night-soil was found to encourage the disease.—*F. J. C.*

Primula Littoniana (*Bot. Mag.* tab. 8341).—Nat. ord. *Primulaceae*; tribe *Primuleae*. Western China. Herb, 1-2 feet high; leaves obtuse, narrowed at base, 8 inches long; scape 2 feet high, with a dense, many-flowered spike, 3-5 inches long and $1\frac{1}{2}$ inch across; flowers reflexed, densely crowded, violet-blue.—*G. H.*

Pyracantha angustifolia (*Bot. Mag.* tab. 8345).—Nat. ord. *Rosaceae*; tribe *Pomeae*. South-Western China. Spring-flowering shrub; leaves clustered, $2\frac{1}{2}$ inches long; corymbs few-flowered; petals white, sub-orbicular; fruit depressed globular, orange-yellow.—*G. H.*

Rhodazalea, or Yellow Rhododendron. By J. Gérôme (*Le Jard.* xxiv. 566, p. 279; September 20, 1910; with 3 figs.) \times *Rhodazalea Crouxii* and its double variety, the product of a rhododendron crossed with *Azalea mollis*, are hardy yellow rhododendrons. *Rhodazalea* differs from the hybrids of rhododendrons and azaleas known as *Azaleodendron* by the number of its stamens, which are 5, while the latter has 10. This difference in the number of the stamens keeps the two groups (*Rhododendron* and *Azalea*) distinct in horticulture. The author goes on to discuss nomenclature of hybrids, and the alterations in the rules of successive International Congresses.—*F. A. W.*

Roridula dentata. By Dr. R. Marloth (*Gard. Mag.*, No. 2961, July 30, 1910, p. 588).—A description of this shrub, often called the Fly-bush, was given before the Royal Society of South Africa. It grows one to four feet tall and produces leaves with stalked glands which secrete a viscid fluid, trapping many insects. It is not, however, as previously supposed, an insectivorous plant, as the fluid has no digestive properties and must not, therefore, be included amongst them. The viscid fluid is probably only a protection against slugs and creeping insects, &c.—*E. B.*

Rosa Moyesii (*Bot. Mag.* tab. 8338).—Nat. ord. *Rosaceae*; tribe *Roseae*. Western China. Shrub, 8-10 feet high; leaves with 7-13 leaflets, 3-7 inches long; flowers deep blood-red, petals paler outside, $2\frac{1}{2}$ inches across; fruit deep orange, $2\frac{1}{2}$ inches long.—*G. H.*

Rusts of Tsuga canadensis. By P. Spaulding (*Phytopathology*, i. pt. 3, pp. 94-96; June 1911; figs.) The author has found *Peridermium Peckii* to be the most abundant and widely distributed of the *Tsuga* rusts, occurring on both *T. canadensis* and *T. caroliniana*, attacking the leaves. A second form has been described as *P. fructigenum* Arthur (*Caeoma Tsugae* Perley); it attacks the cones. A form on the shoots not differing morphologically from that

on the cones is also recorded. The two do not always occur together. Dr. Arthur has suggested that *Pucciniastrum minimum* which attacks species of *Azalea* is the alternate stage of *Peridermium fructigenum* and this the author considers probable. The distribution of the different species is discussed.—*F. J. C.*

San José Scale, Some Sprays for its Control. By C. G. Woodbury (*U.S.A. Agr. Exp. Stn., Purdue, Bull.* 138; Vol. XV.; February 1910; 7 figs.).—Among the many sprays experimented with the author considers that a home-made lime-sulphur wash, the formula for which is given, is the most satisfactory spray for the San José scale, two applications being necessary if the trees are badly infested. The spraying must be done during the dormant period.—*V. G. J.*

Scale Insects in West Indies by Fungoid Parasites, Control of. By F. W. South (*West Indian Bull.* vol. xi. 1, p. 1; 1910).—The last two years have seen a great increase in the practice of destroying insect pests by means of fungoid parasites.

The application of the principle was at first suggested by Pasteur's discovery in 1870 of the bacterial disease of silkworms, and for the last 27 years work has been proceeding in the United States in this direction.

Scale insects, cabbage caterpillars, grasshoppers and others have been experimented upon.

Information on the same subject has been received from other countries, Cuba, Ceylon, S. Africa, Australia, &c.

In Florida, the application of Bordeaux mixture on orange trees for another purpose resulted in a large increase of scale, of which the fungoid enemy had evidently been destroyed. The fungi can be distributed where not naturally present by spraying the scale-infected trees with water in which the fungus has been freely liberated, or by tying fungus-infected leaves into the trees in close contact with healthy scale insects.

In Montserrat, where limes are often badly infested with scale, a growth of "Bengal Beans" round each tree has been found most beneficial, as affording shelter and protection to fungoid and other parasites and also improving the general health of the trees (besides the known effect of increased nitrogen). A low temperature checks the parasites, wind dries them up, whereas they flourish under moist conditions.

A visitation of volcanic ash from Mont Pelée together with a dry season materially checked the fungi in Dominica in 1903. Obviously in a very dry season, unfavourable to parasites, spraying might be advisable, until the fungi regained their vigour, but in this case sulphur and other fungicidal ingredients must be avoided.

A second part of the paper deals with the distribution of the fungi among the Islands, and Part 3 gives a description of the four species of fungi.—*C. H. L.*

Scale Insects, The Identity and Synonymy of some of our Soft. By J. G. Sanders (*Jour. Econ. Entom.* vol. 2, pt. 6, pp.

428-448; December 1909; figs.).—After pointing out the great confusion existing in the nomenclature of many of the scale insects, especially as many entomologists have regarded as distinct species similar forms feeding on different hosts, the author discusses the synonymy and host plants of some of the more common ones.—*F. J. C.*

Scolytid Beetles, Contributions towards a Monograph of the. By A. D. Hopkins, Ph.D. (*U.S.A. Dept. Agr., Bur. Entom., Tech. Series 17, Part I. June 30, 1909, many illustrations and distribution maps*). The first part of this bulletin is entitled "The Genus *Dendroctonus*" and embodies the results of extensive systematic investigations of the genus, carried on by Doctor Hopkins during the past seventeen years, and is of especial interest and importance from the fact that it deals with a small group of beetles which are most destructive enemies of the principal coniferous trees of North America.
V. G. J.

Seed Barley by Specific Gravity Method, Separation of. By H. B. Derr (*U.S.A. Dep. Agr., Bur. Pl. Ind., Circ. 62; May 1910*).—The barley crop in the United States for 1909 was poorer than the ten years' average from 1900 to 1909. This may have resulted from the use of inferior seed. The six-rowed barley being most grown, it follows from the distribution of the grain in the ear that the lateral grains are not as full and heavy, and therefore not so good for seed as the plump and well-developed median grains.

It is well to separate them by the specific gravity method, either with or without the use of the fanning-mill in addition. A successful process is the immersion of the seed-barley in a tub of water, thorough stirring and subsequent skimming off the lighter and smaller seeds which float. One pound of formalin to forty gallons of water will combine treatment for smut with the above single and efficacious method of separation.—*C. H. L.*

Seeds, The Production of Vegetable. By W. W. Tracy (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull. 184; August 1910*).—The ever-growing requirements of agriculture make it necessary for the seedsman to contract with farmers for a large part of their seeds, the latter having to come up a certain standard of purity, vitality, and quantity. The seedsman provides the seed and claims the crop, paying the farmer so much for land and labour for every pound of seed grown according to agreement.

The necessary elements in garden seeds are: appearance, vitality, purity of stock, and the relative supply and demand. In the case of peas and beans the seedsman often employs his own men to go over the crops and "rogue" out inferior and undesirable plants. This is not so necessary with sweet corn, but here care is required to prevent cross-pollination and in the curing and harvesting of the seed.

Seedsman should not depend only on apparent excellence of

"sample," but inquire carefully into "stock" (i.e. breeding and ancestry).—C. H. L.

Soil Productiveness, Effect of Earthworms on. By Dr. E. J. Russell (*Jour. Agr. Sci.* iii. pt. 3, pp. 246-257, September 1910).—The author gives the results of an interesting series of experiments with earthworms in pots and their influence in increasing the yield of plants. His conclusions are that:—

1. Earthworms do not appear to have any marked direct effect on the production of plant food. Organic matter seems to decompose with formation of nitrates equally quickly whether they are present or not.

2. They are rich in nitrogen, containing about 1.5 to 2 per cent., and they decompose rapidly and completely; thus they furnish a certain amount of plant food to the soil when they die.

3. Their chief work is to act as cultivators, loosening and mulching the soil, facilitating aeration and drainage by their burrows.—F. J. C.

Soot, Note on the Composition of. By H. W. Harvey (*Jour. Agr. Sci.* iii. pt. 4, pp. 388-389; December 1910).—A relation was found between the volume weight of soot and its nitrogen content. The lighter contained the greater percentage of nitrogen. The percentage of nitrogen varied from .5 per cent. from a 40 ft. boiler shaft to 11 per cent. from a kitchen chimney. The average was about 3.5 per cent., and the average value of the nitrogen in a bushel of soot 6d.—F. J. C.

Sorghum Midge. The (*Contarinia* [*Diplosis*] *sorghicola* Coq.) By W. H. Dean (*U.S.A. Dept. Agr., Bur. Entom., Bull.* 85 Part IV. May 23, 1910, 12 figs. 2 plates).—An account of the life history of this pest with suggested remedial measures.—V. G. J.

Soya hispida. By M. Gibault (*Jour. Soc. Nat. Hort. Fr.*; Ser. 4; vol. xi. p. 622; October 1910).—This plant is a native of Cochin China and the country stretching from there to Central Japan. It has been cultivated all over the Far East, the Indian Archipelago, Siam, Tonkin, &c. It is even found in Mexico and Rhode Island, where it forms an important crop. The soy is easy of digestion, contains important elements of nourishment, and among Asiatics takes the place of butter, oil, and milk. It is allowed to swell in water, pressed through a sieve, and the resulting paste is mixed with water to form a liquid answering all the purposes of milk. A valuable oil may be extracted from the peas, and the resulting cake makes good food for stock.

In the climate of Paris only the yellow varieties from China and Mongolia will thrive, but other varieties may be cultivated South of the Loire, and even the least hardy kinds will grow in Provence, Languedoc, and Algeria.—M. L. H.

Soya hispida. By F. H. (*Le Jard.* xxiv. 548, p. 233; August 5, 1910; with 1 fig.).—Points out the nutritive value of the Chinese

oleaginous Pea, both as fodder and bedding for cattle, and as an article of human food. Compared with other Leguminosae this plant contains :

Composition	Soya	Haricot	Pea	Lentil	Bean	Yellow Lupin
Water	6.91	15.0	13.92	13.4	16.46	16.61
Nitrogenous matters	38.29	26.9	21.72	24.0	24.88	35.82
Fatty substance	18.71	3.0	2.01	26.0	1.67	4.97
Non-nitrogenous extractives	26.20	48.8	54.27	49.4	47.16	29.17
Cellulose	5.33	2.8	4.50	6.9	6.81	14.15
Ash	4.56	3.5	2.57	3.7	2.28	3.78

As fodder, both seeds and green tops are invaluable. When the oil has been extracted, the residue forms an oil-cake containing 45.5 per cent. protein. Like other Leguminosae this plant enriches the soil with nitrogen.

As food for man, the beans are used in the East as substitutes for butter, oil and milk. The expressed juice makes an excellent cheese known as *To-fu*, which can be eaten raw or fried like potatoes. The beans are the principal ingredient of Indian Soy Sauce. The small starch content also renders them a valuable article of diet in diabetes. Recipes are given in the article.—*F. A. W.*

Strawberry Leaf-spot (*Jour. Bd. Agr.* vol. xvii. p. 476, September 1910, plate).—The following method of combating the disease has proved highly satisfactory when strawberry beds are badly rusted. The beds should be mown soon after the fruit is gathered, covering the dry leaves with a sprinkling of straw or dry litter and burning them.—*W. S.*

Strawberry "Regina." By Abbi Touraine (*Le Jard.* xxix. 565, p. 262; September 5, 1910; 1 fig.).—A new perpetual strawberry, out of *Cemina* and *Suavis*. Thrives on poor soil. The runners are very fertile; those taken off in the spring will flower in August and fruit in September. Fruit large, triangular, firm and juicy. Deep pink, white inside.—*F. A. W.*

Styrax Hemsleyanus (*Bot. Mag.* tab. 8339).—Nat. ord. *Styracaceae*. Central China. Tree 20-30 feet high; leaves obovate-elliptic, 5 inches long; inflorescence racemose or subpaniculate, 3-6 inches long; flowers $1\frac{1}{4}$ inch across; corolla white.—*G. H.*

Sugar-Beet Seed, Conditions influencing the Production of in U.S. By C. O. Townsend (*U.S.A. Dep. Agr., Year Book*, 1909).—About three-quarters of a million dollars annually are spent by the United States abroad in purchase of seed, which probably could be equally well raised at home.

The first step towards high-grade seed is the production of roots of satisfactory shape, size, equality, and these can be found in practically every section of the sugar-beet belt.

Climatic conditions are important and must be reckoned with. Absence of disease in the seed-producing roots is imperative.

The best means of preserving the roots through the winter has been found in the silo, or heap, in which layers of sand, slightly moist, alternate with the beet. They emerge fresh and crisp in the spring.

Testing the roots for sugar is most important, for this characteristic varies tremendously. Seeds from the same plant, when grown in different parts of the country, have varied as much as 7 per cent. in sugar content while preserving the same external characteristics.

It is essential that the seed, when every care has been taken in its cultivation in all stages, should obtain for itself a good reputation with the growers. The producer must therefore be a man known for straightforward business ability, and he must exercise the strictest selection in his seed from year to year. At present the chief difficulties in sugar-beet seed production are the scarcity of labour, the high transportation rates in the country compared with Europe, and vested interests in imported seed, but a good beginning has been made.

C. H. L.

Sugar Beets, Tuberculosis of. By E. F. Smith (*U.S.A. Dept. Agr., Bur. Pl. Ind., Bull.* 213; February 1911; illustrations).—Diseased beets from Colorado and Kansas showing small, water-soaked, brownish areas teeming with bacteria, and usually with a small cavity in the middle, were examined in 1910. The diseased portions externally showed small central radiating fissures, and within appeared mucilaginous. An organism, now named *Bacterium beticolum*, was isolated and infection experiments were carried out. Descriptions of the *Bacterium* and of some of its cultural characteristics are given.

F. J. C.

Sugar Cane in Antigua, Root Disease of. By H. A. Tempary (*West Indian Bull.* vol. x., 4, p. 343; 1910).—In 1905 a circular was sent to the majority of estate owners and managers in Antigua to ascertain the position of the sugar industry with regard to cane disease. The result may be summarized as follows:—

(1) It appears that the root-disease of sugar-cane is prevalent in all districts of Antigua.

(2) Although the recognition of the disease is made by some planters, it will have to be largely extended before it is effected by all.

(3) The remedies of the disease appear to be fairly well-known, but until the recognition of it attains a greater efficiency, it is doubtful whether they will be applied as generally as is expedient.—C. H. L.

Sweet Pea Colouring, On the Inheritance of the Yellow Tinge in. By M. G. Thoday and D. Thoday (*Proc. Camb. Phil. Soc.* xvi. (1911), 1, pp. 71-84).—The authors have studied the behaviour of the yellow tinge in sweet peas and conclude that ‘the deep yellow tinge in deep ‘Queen Alexandra,’ deep salmon, and deep cream sweet pea flowers appears to be dependent upon three coincident recessive

characters." Each of these brings in a component which is visible by itself on the magenta or pink ground, and adds independently to the intensity of the deeper forms. Two of them, one wholly, the other almost wholly, self-colours, tinge the whole flower, the third connected with the occurrence of clusters of golden yellow plastids chiefly affects the standard producing marked bicoloured forms. Thus deep or pale magenta is dominant to scarlet or salmon sap colour, and magenta sap may be pure or tinged with yellow, and salmon sap pale or deep. Whatever the sap colour, absence of yellow plastids is dominant to their occurrence. "There are thus between deep or pale magenta and deep scarlet or salmon a number of forms intermediate in yellowness," and they may be arranged in two categories, each self-coloured form having a corresponding bicoloured one to which it is dominant. The self-coloured form has no plastids, the bicoloured one has numerous plastids in its standard.

In the absence of yellow plastids the flower does not "burn."

It appears also that two factors are necessary to produce the intensification by which pink becomes red. The paper must be consulted for full details concerning the behaviour of the families obtained.—*F. J. C.*

Tobacco Insects, Methods of Controlling. By A. C. Morgan. (*U.S.A. Dept. Agr. Bur. Entom., Circ. 123*; June 10, 1910, 11 figs. 2 tables).—In the investigations carried on by the Bureau all insects found affecting tobacco have been studied, but particular attention has been given to the tobacco flea-beetle (*Epitrix paroula* Fab.) and to the tobacco horn-worms (*Phlegethontius sexta* Joh., and *P. quinquemaculata* Haw.). In this particular circular only these insects are considered, a description being given to them, their ways, and the best means of controlling them.—*V. G. J.*

Tree Diseases, Experiments with. By E. Münch (*Nat. Zeit. Land. Forst.* vol. viii. p. 389 and p. 425, 1910).—In a lengthy research the author examines the course of infection of a number of Polyporeae, the fungi so destructive to growing timber. Trees were infected by means of pure cultures of the various fungi, and the results investigated. Besides species already well-known as destructive, the action of other doubtful species was also examined, so that the investigation throws considerable light on the earlier stages of tree-rot.—*W. G. S.*

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PART II.

THE ORIGIN OF MONOCOTYLEDONS FROM AQUATIC DICOTYLEDONS.

By THE REV. PROFESSOR G. HENSLOW, M.A., F.L.S., V.M.H.

[Read June 20, 1911.]

A VERY general conviction is now prevalent among botanists that Monocotyledons were, somehow, derived from Dicotyledons, for fossil botany has shown that the first flowering plants or Gymnosperms were undoubtedly derived by descent from ferns or at least fern-allies, such as the *Cycadofilices* and *Cycadophyta*.* Although no actual member of the most primitive Angiosperms with a closed up ovary bearing a style with stigmas is at present known, yet since the former are mostly dicotyledonous, it is a justifiable conclusion that the class Dicotyledons was the first of the Angiosperms to be evolved. Numerous writers have called attention to very many morphological and anatomical features of Monocotyledons, which are paralleled by similar ones in aquatic Dicotyledons; for it is noticeable that the greater number of species referred to by writers are dicotyledonous water-plants.

My object is to show that *all* such coincidences, taken collectively, *prove* incontestably that Monocotyledons *were* actually descended from aquatic Dicotyledons. The proof is, of course, mainly *inductive*; i.e., it rests upon a vast accumulation of agreements or coincidences between them. Not only does this concern the aquatic species of the two classes, upon which water acts alike, but *all* terrestrial Monocotyledons were ancestrally aquatic; later, on recovering their position on dry land, they merely re-adapted themselves to air, by altering the internal anatomy and external epidermis so as to become denizens of

* *Studies in Fossil Botany*, D. H. Scott. II. pp. 498, 604.

the earth and air. Though they have done this, they have more or less retained the morphological characters which they acquired through the direct action of water.

Evidences from the Distribution of Monocotyledons.—That Monocotyledons arose in the tropical or sub-tropical regions, where great heat and moisture prevail, is inferred from the fact that by far the greater number of orders or families of this class are now tropical or sub-tropical. Thus Sir J. D. HOOKER has shown that the average proportion of the families of Monocotyledons and of Dicotyledons is 1: 3·7 in tropical floras and 1: 4·8 in sub-tropical; the discrepancy increases in colder zones so that only six families of Monocotyledons are represented in Arctic and Antarctic regions.

The Degeneracy of Monocotyledons.—The first comparison to be made between terrestrial Dicotyledons and all Monocotyledons is the universal degeneracy of the latter. Many botanists have noticed this; for it is observable in all parts of the organism when contrasted with the corresponding ones of land plants of the other class. This simpler construction at first led to the belief that they must be a more primitive group; but a more critical examination proves that this general simplicity is really the result of degeneracy through the direct action of water, which causes all aquatic flowering plants to be alike in this respect. This degeneracy had previously been somewhat overlooked, but it at once destroys the theory of primitiveness of Monocotyledons, for the more perfect and elaborate structure of Dicotyledons could never have arisen out of the degraded and permanently fixed conditions of aquatic plants. *Morphological characters when long lost*, cannot be recovered, as will be proved later on.

In my last lecture on the effects of water on plants (pp. 88-94) I drew attention to the deteriorating influence of water upon roots, stems, leaves, and reproductive organs. I propose now to show that a similar degeneracy occurs in *all* Monocotyledons, whether they be aquatic or terrestrial plants.

The Effect of Water upon Roots.—The immediate result of allowing seeds of any dicotyledonous terrestrial plant to germinate over water is to arrest the radicles or primary roots as soon as they enter it. The fact that all Monocotyledons are deprived of a tap-root, or if it continued for a short time, as in the maize or the date, it soon perishes, was noticed so long ago as 1808,* for M. PORTEAU quotes M. RICHARD as saying that “the almost sudden destruction of the radicle appears to be a character of Monocotyledons.” To this M. PORTEAU adds:—“If we pass in review all the monocotyledonous plants known, we shall see that not one has a tap-root.”

It has also long been noticed that the root-cap has its formative tissue independent of that forming all the rest of the tissues of the root. I have shown how this feature can be readily induced in the

* *Mémoire sur l'Embryon des Graminées, des Cyperacées et du Nelumbo* (1808). Par A. Poiteau.

adventitious rootlets of dicotyledonous seeds when made to germinate in water.

The degeneracy in the anatomical structure of aquatic roots is also seen in the presence of air-chambers or lacunæ and in the degradation of the vascular cylinder, such not being the case in plants of the same species when growing on land.

In Palms, all being terrestrial, lacunæ are nevertheless characteristic of the roots of many species; obviously an "aquatic character" retained, although palms are now no longer aquatic plants. Even the leaves of the banana have them.

Proportion of Aquatic Orders of Monocotyledons.—Of seventy-four British families of Dicotyledons, five only are aquatic; whereas of fifteen British families of Monocotyledons, eight are decidedly aquatic. That is to say, while 7 per cent. are aquatic among Dicotyledons, 53 per cent. are aquatic among Monocotyledons.

The Effect of Water upon Stems.—The stems of Monocotyledons, generally, reveal an internal structure eminently characteristic of the class. A transverse section shows the vascular bundles to be scattered indiscriminately over the cellular ground-tissue and not arranged, closely compacted, to form concentric cylinders of wood, as in all timber trees among Dicotyledons. In these there is the active layer just outside the wood, which forms a new cylinder every year. In Monocotyledons this so-called cambium-layer is wanting, though traces of it are found in various places, degraded reminiscences of a former effective structure.

This scattered condition of the bundles is well seen in terrestrial Monocotyledons as palm-stems, asparagus, &c.; it is found in the rhizome of waterlilies, and in many aerial stems and petioles of aquatic Dicotyledons, as described in my last lecture.

We have seen that lacunæ or air-chambers are characteristic of aquatic roots and stems: and although they are not now present in living palm-stems, some fossil palms have been found with aërenchyma in the stems, indicating an original aquatic habit. This aërenchyma is a common feature in many Monocotyledons which grow in marshy ground, but have their leaves and stems in air, as in rushes, sedges, &c. It is also found in the flower-stems of waterlilies and the petioles of *Ranunculus Ficaria*, the lesser Celandine, undoubtedly once a true aquatic plant; both of these are Dicotyledons.

The effect of Water upon the leaves of some aquatic and other plants.—The large size of the blade is a characteristic feature of certain aquatic and water-loving plants. The *Victoria regia*, *Gunnera*, and Rhubarb, so-called from the old name Rha (hence *Rheum*) of the Volga, are well-known examples. Our butter-bur (*Petasites*) may be compared with the Colts-foot. Lastly, Palm-trees, bananas, and some Aroids have enormous leaves; a single leaf of the Talipot palm has been known to shelter a whole family. The largest leaf belongs to *Ravenala*, the Travellers' tree. The number of genera of Monocotyledons with arborescent species is very small. These are a few

of the Lily family, as *Yucca*, *Cordylina*, and *Dracaena*; *Pandanus*, *Ravenala*, and *Xanthorrhoea* of other families pretty well complete the list.

On the other hand, the largest dicotyledonous trees, as the Gum trees and *Wellingtonia*, have small leaves, while arborescent species are many.

Another characteristic feature of Monocotyledons is the parallel venation of the leaf-blades, as of tulips, hyacinths, grasses, sedges, &c. But the supposed or so-called blade is really, *i.e.* homologously, the petiole only, no true blade being formed in these plants.

The condition results from the scattered condition of the vascular cords in the stem. A number of these near the circumference pass outward and enter the sheathing base of the leaf and then run parallel or slightly curved to the top.

If a blade be formed at all, the first type is an oval termination to the parallel-veined basal part produced by their curving outwards. The next form is a spear-shaped blade, caused by the outer veins curving downwards. The third stage is seen in the arrow-head form; the next is to have the space filled in so that the petiole is now attached to the blade in the middle, which becomes peltate, but this name is better applied to the blade when it is rounded as in the Lotus, and our pennywort.

These forms can be seen in the germinating *Victoria* and in the arrowhead. These are both aquatic plants; but similar forms are seen in many of the Arum family which are terrestrial, as in *Arum maculatum* of our hedgerows.

These types of blade acquire reticulations or a netted-veined structure, *imitating*, but not altogether *identical* with, those of Dicotyledons, the cause of the differences being that water has interfered so as to produce degradations, and the net-veined types of certain Monocotyledons show the effort made to adjust the blades to the same aërial conditions as those to which blades of dicotyledonous leaves are adapted. Thus a Monocotyledon has, as a rule, no solid mid-rib like that of a Dicotyledon. If such be required for strength a cluster of *separate* cords are crowded together; then as the blade widens each in turn deviates right or left, till there may be none left to reach the apex of the blade. This can easily be studied in the leaves of *Arum maculatum*, especially in the first formed, elliptical blades—presumably survivals of a floating type. Attempts to form a cordate blade with a rounded summit often occur in this plant.

Degeneracy in the Reproductive Organs of Monocotyledons.—The first and most obvious feature in flowers is that while the floral whorls are usually in fours or fives in Dicotyledons, they are only in threes in Monocotyledons. These numbers result from their leaf arrangements.

When a plant has "opposite and decussate" leaves—that is the two leaves of each pair stand at the same level or node, and the pairs next above and below are at right angles to them—then, if this is carried up

into the flowers, we usually get one with fours, as in Fuchsias, privet, &c. If, however, internodes be developed *between* the two leaves of each pair, then the arrangement becomes a spiral, and a line drawn through each leaf is like a corkscrew. Now it will be found that, calling any leaf No. 1, the *sixth* will stand over it, leaves Nos. 1 to 5 constituting a "cycle." Let the spiral line be suppressed like a watch-spring, then the five leaves of a cycle or their representatives as sepals, petals, &c., form a floral "whorl."

The leaves in pairs follow from Dicotyledons having two opposite cotyledons. In Monocotyledons, *one* cotyledon is arrested, so that the first leaf usually stands over the position of the lost cotyledon, and the leaves run in two lines only, as seen in grasses, orchids, iris, &c. But Nature has an alternative, and can place *three* leaves in a circle. This occurs in sedges, and is usual in floral whorls; hence arose the reduction in the number of parts of flowers of Monocotyledons to three in each whorl. The arrest of one cotyledon is still to be seen in some Dicotyledons, as in the aquatic *Trapa*, the formerly aquatic *Ranunculus Ficaria*, and in some terrestrial plants, as *Bunium*, *Corydalis*, and *Cyclamen*. The rudiment of a second cotyledon was first noticed in wheat by MALPIGHI,* who regarded it, conjointly with the scutellum or cotyledon as composing an involucre. M. POITEAU, however, considered it to be a rudiment of the second cotyledon, observing: "Does not its insertion immediately opposite to that of the cotyledon indicate that it is the rudiment of a second cotyledon? I have found it also in the oat; it is replaced by a scar in the barley; no vestige of it is seen in the maize nor in many other grasses. . . . If grasses approach sedges in habit, leaves, and flowers, they are distinctly removed from them by the embryo, which appears to have very considerable agreements with that of Dicotyledons."†

A word in explanation must be given as to the cause of the "endogenous" character of the tap-root of the monocotyledonous embryo; though that of a dicotyledonous one is, strictly speaking, endogenous as well. They differ in the amount of cortical tissue or periblem, that of Monocotyledons being thicker; the cause of its being so may *perhaps* be referred to the *now* hereditary tendency to arrest the axial root. This has presumably induced the periblem to take on a greater activity in multiplying its cells, thereby producing a thicker covering to the pericycle which in turn covers the merismatic apex of the plerome.

In Dicotyledons the apical point of the plerome of the embryo with its pericycle abuts against the dermatogen and so appears to be exogenous.

Conclusion.—Space will not admit of further illustrations and proofs; but the reader is referred to my two papers, one in the *Journal*

* *Anatome Plantarum*, tom. 2, p. 10, tab. 5 (1671).

† *Mémoire sur l'Embryon des Graminées, des Cyperactes et du Nelumbo* (1808).

of the *Linnean Society** (1892), and the other in the *Annals of Botany* (July, 1911).†

The readers of my last lecture (see pp. 88-94) will remember that the influence of water in the modification of the structure of land plants was fully explained and illustrated by experiments upon the roots, stems, and foliage. We have now seen that precisely the same structures are to be found in terrestrial as well as aquatic Monocotyledons; so that the proofs of the *fact* that this class has descended from aquatic Dicotyledons rest on a vast accumulation of coincidences, such forming a mass of incontestible inductive evidence. Secondly, this is completely verified by experiments. Science requires nothing further for the establishment of truth.

* *A Theoretical Origin of Endogens from Exogens, through Self-Adaptation to an Aquatic Habit.*

† *The Origin of Monocotyledons from Dicotyledons through Self-Adaptation to a Moist or Aquatic Habit.*

SMALL-HOLDINGS AND THE SMALL-HOLDER.

By THOMAS SMITH, F.R.H.S., Supervisor of the Fels Small-Holdings.

[Read September 12, 1911.]

IN the following paper I have endeavoured to explain what I consider to be the conditions under which a small-holder should work and the qualifications he should possess in order that he may have a reasonable prospect of success in his undertaking; but in order to make my point of view clear, I must first inquire into the causes of rural depopulation, and the circumstances which make a re-colonization of the country districts by means of small-holdings desirable in the interests of the State.

Everyone knows that the land is the ultimate source of wealth, and that the stamina and reproductive powers of a nation rest to a large extent in the workers on the land. It is a matter of history that any nation which allows its agricultural industries to become neglected has, sooner or later, to pay a heavy reckoning; in fact, the decay of a nation's agriculture has always been a prelude to its downfall.

Early in the eighteenth century England was very largely a country of small-holdings, but towards the middle of the century an agricultural revolution commenced, in which the small farm was absorbed into the large farm, commons were enclosed, and the yeoman and small-holder were reduced to dependence upon wage earning. The axiom was evolved that the large farmer was the only sound agricultural unit. Undoubtedly many notable technical advances were achieved, but the revolution involved a social tragedy, and to it may be traced many of the evils of the present-day agricultural conditions in England.

The large farm was an arable farm, and the cause which promoted the formation of the large farm was the high price of corn. The first half of the eighteenth century was a period of good harvests and cheap corn; the second half one of bad harvests and dear corn. The war with France drove the prices up to famine height, and the Corn Laws and bad harvests combined to keep them there after the peace, the average price of wheat for ten years ending 1819 being 92s. per quarter. It thus became profitable to put any land under the plough for corn-growing, and the greatest profit was made when the operations were conducted on a large scale, under capitalist exploitation. Under these circumstances there was a strong economic force making for the consolidation of small into large holdings. This was powerfully assisted by another economic force: the things to which the small-holder principally devoted his attention were those which the large farmer as a rule considered beneath his notice, such as dairy produce, market gardening, pigs and poultry, and as the price of corn mounted

the real wages of the working classes—the purchasing-power of the money received by them—fell; there was appalling poverty, and as a consequence the demand for the products of small-holdings dwindled away. The repeal of the Corn Laws produced no immediate reaction, the price of wheat having fallen only very gradually, with many fluctuations, from 74s. 6d. in 1819, to 45s. in 1882, and it was not until 1884 that prices broke heavily. Wheat-growing then became unprofitable, and the large-farm system built up on arable land collapsed.

At the beginning of the nineteenth century, labour-saving machinery and the system of concentrating the workers in factories were introduced into many industries, with the result that the supremacy of corn-growing as a speedy road to fortune was challenged, and a tempting bait in the form of higher wages was offered to the wretchedly paid farm labourers; this may be said to be the commencement of the exodus from country to town. Even whilst the large-farm system was still flourishing it found a powerful rival in manufactures and commerce, to the exploitation of which most of the energy, brains, and capital of the country were becoming directed. With the great fall in the price of corn this movement in favour of commerce was intensified, agriculture and all in connexion with it becoming almost completely neglected—a neglect from which it is still suffering. Vast tracts of fertile land have been allowed to revert more or less to a state of nature, or are being so inefficiently cultivated that instead of the bulk of our foodstuffs being produced at home, as they could and ought to be, importations from abroad have now reached the proportion of four-fifths of our requirements.

This matter of the food supply of the people shows signs of soon becoming a more serious affair than many people imagine. The world's consuming power is rapidly overtaking its producing power. In all civilized countries the classes who are consumers of foodstuffs are getting more and more disproportionate to those who are food producers. Everywhere agriculture is receiving less attention than it ought by reason of the attraction of the higher-paid industrial arts and the allurements of city life. As an instance, the Secretary of the American Board of Agriculture—Mr. Willet M. Hays—says that in the United States only one-third of the population can now be described as food-producers, the other two-thirds being consumers, whereas only two generations ago the conditions were exactly the reverse. In no country, however, has the situation become so acute as in England, and the indications are that the time is not far distant when, unless in the meantime we repopulate the deserted countryside, we shall be faced with the problem: How are the people to be fed?

Nor is the question of food-production the only matter of serious import in this connexion. We are also faced with the fact of a continuous lowering of the average stamina and physique of the whole of the nation. The rural population—the hitherto inexhaustible source of our physical excellence—has steadily drifted away, partly to the

congested areas of our large cities and partly to lands across the seas. This depletion of the rural population has gone on until some districts are now practically destitute of young able-bodied men, most who remain being either elderly and slow or in some way deficient. The seriousness of such a state of things is apparent to everyone who gives it consideration, matters having come to such a pass that unless some efficient means is taken not only to check but to reverse the migration, England will soon be in serious danger of losing her position amongst the great nations. The people of the British Isles have to hold their own against far greater populations, and this cannot continue to be accomplished if matters are allowed to continue drifting along in the present way. We shall soon be forced to recognize the fact that the real strength of a country does not rest in huge armaments but in the bone and muscle, the brain and judgment, and the happiness and contentment of the mass of the common people.

I think I have now made it clear that the problem of how to increase the rural population is urgent for solution. The Small-holdings Act was no doubt intended as a step in this direction, but I submit that its authors have not realized all or even the most important of the facts of the situation. A more or less unsatisfactory attempt is being made to provide access to the land, but even if access were made easy, provision of the bare land is totally inadequate to the occasion. Before, however, I place before you my views of what is necessary, it will be useful to inquire a little further into the causes of the rural exodus.

Many and varied reasons have been advanced to account for the migration from country districts. The attraction of higher wages in the towns doubtless has been and still is a potent factor; bad housing conditions in country districts has played its evil part; the hopeless outlook which practically condemns the labourer to wages which are a mere pittance during his best years, with the probability of ending his days as a pauper, is of itself enough to cause every man of independent spirit to seize the first opportunity offering better fortune elsewhere. Each of these influences has certainly much to answer for, but judging from an experience of many years spent in direct contact with workers on the land, I am convinced that the most active influence of all in causing the rural population to be dissatisfied with their surroundings is the lonely and mentally barren existence to which under existing circumstances they are condemned.

Before the advent of railways and compulsory elementary education they did not and could not imagine how much more of interest life contained than the monotonous daily round they were accustomed to, but with the ability to read and the opportunity of cheap excursions on holidays their ideas expanded—they became aware of the existence of a larger world, fuller of interest and excitement than anything they had previously dreamt of—and having gained such knowledge and contrasted their own drab mode of life with the possibilities of change and improvement lying within their reach, the result was inevitable.

Nor is the man who, under present conditions, undertakes to wring a living out of a small-holding as a rule much better off than the farm labourer. If he is fortunate enough to possess sufficient capital for his purpose and has a practical knowledge of the business he has undertaken, he may get along fairly well and his life will be comparatively free from worry and privation. But they are few, indeed, who are so happily circumstanced. The average man has to fight from hand to mouth, leading a life of brutalizing drudgery. If he is to have the remotest prospect of success, he and his family must make a special study of the art of elimination. They must learn to do without all sorts of conveniences and amenities which people in civilized communities have come to regard as necessary to their well-being. Leisure and comfort must be abjured and life reduced to securing the elementary necessities of food and shelter, and then only as the result of hard and unrelenting toil. After years of unnecessary work and worry, of those who persist in the struggle a few ultimately emerge with a measure of success, but the large majority go under. Through it all there is, as of old, the nerve-racking monotony and loneliness for the women and the indifferent education and lack of opportunities for the advancement of the children. No free and progressive people can be expected to be, nor ought to be, satisfied with such an existence.

Taking all the circumstances into account, I submit that no permanent improvement in the situation is possible until the worker on the land is assured not only of an existence under much better material conditions than hitherto, but also of being afforded more leisure, more frequent opportunities for intercourse with his fellow-men, and of being kept in closer touch with the multitudinous matters of human interest which form the mental life of all civilized communities. In these progressive days, and in such a liberty-loving land as ours, it is futile to attempt to find a solution under conditions less reasonable.

In any national scheme intended to attract the people back to the land, one would expect to find that those aspects of the question to which I have drawn attention would be recognized and dealt with, but in the Small Holdings Act they are entirely ignored, and while that is so I contend that it can never be a success. Agriculture has been so long neglected that exceptional remedial measures are necessary to restore a proper balance between it and the industrial and intellectual life of the nation. There are plenty of men of suitable type, ready and anxious to settle upon the land, but they are debarred by lack of capital. Of the few who by perseverance are at length enabled to make the adventure, many, from insufficient means, will either make a disastrous failure or be doomed to a life of unnecessary privation and toil. In addition to land the essentials of success include such things as dwelling-house, out-buildings, tools and appliances, manure, in some cases livestock, and, most important of all, a reserve fund to fall back upon in the event of bad seasons in the early years, or of disastrous happenings at any time. If the Small Holdings Act is to have any real chance of accomplishing its purpose it must be supplemented by a fund which,

under proper conditions for repayment, will place such money as is necessary within the reach of eligible men.

In addition to the provision of land and money, the small-holder should be educated in the knowledge of how to use both to the best advantage. The cultivation of the soil is beset with unexpected conditions which make the results of any operation uncertain even for those who have made it their life's business, and it is obvious that success must be much more difficult of attainment for those with little or no experience. This points to the necessity for giving small-holders regular and systematic courses of instruction in the numerous branches into which agricultural pursuits and rural industries are divided and sub-divided. With such expert teaching to supplement the provision of land and capital, re-colonization of the deserted country districts would proceed rapidly on lines by which material success would be assured.

But, as I have already said, the worst condition attending work on the land is the isolation and the evil consequences which arise from it. No small-holding scheme can be really satisfactory which makes no attempt to provide for the social life of the people concerned, or at least to lay the foundations of the scheme so that intercourse between the small-holders themselves and between them and the rest of the world would be easy. To this end I suggest that holdings should be grouped into communities of from 100 to 200 families, all engaged in some main industry or in work allied to it. The choice of the chief industry would, of course, be determined by the suitability of the soil and its position in regard to railways, markets, or large centres of population. In connexion with each community enough land should be held in reserve to provide for the expansion which would inevitably take place, both for subsidiary and complementary enterprises and for social purposes. The cottages and out-buildings should be grouped about a common centre, together with such erections as are necessary for storing, grading, despatching, or in any way manipulating the products on a co-operative basis. A public hall and schools, as well as telegraph, telephone, and post office, would naturally be included, and all sorts of independent business and social agencies would follow in due course. For such a compact community it would be easy and economical to lay on public services of water, light, and motive power, and possibly a light railway connected with a main line. Such a scheme is not only practicable, but would be profitable, even as a cash investment, and it must be remembered that such an investment would be in the soundest bank in the world—the land and the people. The limits of this short paper preclude my giving figures, but I have satisfied myself by careful calculations that after a few years the rents derived from the holdings, business premises, and numerous accessories would give an ample return on the outlay, whilst the benefit to the nation as a whole would be incalculable.

In considering personal qualifications for success in the management of a small holding we meet with the most elusive factor of the

problem. At first sight it would appear to be a matter of no great difficulty to decide upon the qualities which make a man suitable or unsuitable for the purpose in view. The most obvious of the desirable personal characteristics are judgment, foresight, resourcefulness, industry, determination, and unfailing optimism; but whilst it is quite easy to reel off a list of this sort, it is an entirely different matter to correctly label an untried man. Who can say whether or not an average man possesses all or any of these qualities in a sufficient degree until he has been put to the test? We have to remember that the great majority of the aspirants for small-holdings have worked all their lives under direction, for weekly wages, and whilst this fact may be used as an argument against their fitness for a pursuit which needs qualities they have seldom or never been called upon to exercise, and in which the rewards are fluctuating and uncertain, it would be a mistake to let such considerations have too much weight. A sense of responsibility has a wonderful effect on most men, and in operation shows surprising results, and hasty conclusions as to any man's fitness or unfitness should be avoided. I have known instances of men who appeared to be of very moderate quality when working under orders but who have developed in a most surprising way on being released from leading-strings and forced to act upon their own initiative; and on the contrary I know men who are all that could be desired when working under direction and supervision, but who have proved to be complete failures when obliged to depend entirely upon themselves.

Still, the difficulties in the way of a selection of suitable persons can be much reduced by a process of elimination. A character for sobriety, honesty, and industry is absolutely essential, and those lacking these qualities should be rigorously barred out. Those with a poor physique or a weak constitution—especially the latter—must also be classed amongst the unfit, because the long hours of labour and the exposure which is often necessary will tell heavily against the chances of either. No one past middle age, unless work on the land has been his previous occupation, should be encouraged to become a small-holder, because the work is never other than laborious, and after middle age it is no easy matter to persuade a frame which has lost its elasticity to respond satisfactorily to hard work of an unusual kind.

It is necessary that the small-holder should have some knowledge both theoretical and practical, if possible—of the particular branch of agriculture or horticulture he intends to follow. Theory alone is, in the majority of cases, a very dubious equipment for the work to be undertaken, although I have known some do well who knew little when they began beyond what they had learnt from books. At the same time, such a result is possible only when the worker who is engaged in putting recommendations read in books into practice recognizes that all such are liable to modification under varying circumstances and conditions, and when by practical work theoretical knowledge is reduced to a simple chain of cause and effect.

Courses of instruction, especially designed for intending small-

holders and those engaged in work upon the land, should be instituted for imparting information on the laws and conditions which govern the fertility of the soil, to be followed by subsidiary courses in market-gardening, fruit-growing, intensive cultivation, dairying, butter- and cheese-making, stock breeding and raising, poultry- and bee-keeping, grading and packing for market, and in fact in all matters to which a small-holder could profitably turn his attention. These courses should be arranged in groups of allied industries, and State aid should depend not only on the candidate's suitability of character and general fitness, but also upon his obtaining a certificate of proficiency in connexion with a given group of subjects, the examinations being conducted either orally or in writing. Although even then failures in the new undertaking would not be impossible, they would be reduced to a very small proportion of the whole, and the interests both of the State and the individual would be amply safeguarded.

In conclusion, I submit that such a scheme as the one I have outlined presents no insuperable difficulties to a nation which can provide two hundred millions for land purchase in Ireland. With small-holdings laid out and manned on the lines indicated, the rural depopulation problem would soon disappear, the nation's physique would improve, England would be in a fair way to feed herself, and the desert spaces of the country would become covered with industries and thriving villages populated by healthy and contented families, who would add enormously to the real wealth and prosperity of the nation and form an impregnable bulwark to the State.

SALADS AND SALAD-MAKING.

By C. HERMAN SENN, G.C.A., A.I.J.

[Read September 26, 1911.]

SALAD-MAKING and salad-eating are habits of great antiquity. The Romans knew how to appreciate a good salad, but their methods of salad-dressing would hardly appeal to modern palates; for oil, ginger, honey, nitre, and the ubiquitous "garum" (a sauce made of the gills of various pickled fish) were amongst the favourite ingredients. The Romans were in the habit of eating salad at the beginning of a meal as a kind of *hors d'œuvre*, under the idea that it stimulated the appetite, a custom which was followed by our own country during the Middle Ages, and this custom has of late become fashionable again.

The enormous range of herbs grown in England in Elizabethan days, made salad dishes particularly acceptable to our ancestors. It is true that ordinary vegetables were but little eaten, owing to ignorance of the proper methods of cultivation; but, on the other hand, the supply of salad herbs was far more plentiful than nowadays. GERARD, the herbalist, quotes more than thirty as being in general use, viz., Spanish pepper, onion, leek, chives, garlic, turnip-tops, winter cresses, rocket, tarragon, various cresses, garden succory, dandelion leaves, endive, lettuces (wild and cultivated), beet, spinach, Orache or Atriplex, dock leaves, sorrel, roots of rampion, lesser house-leeks, purslane, samplier leaves, brook-lime or water pimpernel, borage, bugloss leaves, hop sprouts, garden burnet, leaves of musk roses and rosemary. Further mention is made in culinary manuscripts of that period of avens or herb bennet, costmary, cultivated in the Middle Ages for the agreeable fragrance of its leaves, dittany, an aromatic plant, hyssop, savoury, tansy, mallow, and pellitory. How many of the above are used in the kitchen nowadays? These herbs were eaten particularly in the spring-time, for the majority of them were believed to have medicinal properties of especial value to the system after the salt-meat diet of the winter months.

The name of JOHN EVELYN naturally rises in connexion with the salads of the past. He it was who, once for all, laid down the true principles of salad-making in his "Acetaria," and no later authority has materially improved upon his theories. Distinguishing between "olera," vegetables for the pot, which should never be eaten raw, and "acetaria," vegetables which should never be boiled, EVELYN declared that to cook a salad by heat or by any slow process of pickling was to deprive it utterly of its essential qualities. He declined to regard fruits as an ingredient in salads, and he certainly knew nothing of the modern combinations of nuts, cheese, fish, eggs, game, and poultry. As regards the dressing, he was of the opinion that an

"artful mixture of mustard, oil, and vinegar, with or without the addition of hard-boiled yolks of new-laid eggs, carefully rubbed into the dressing," was all sufficient. The mayonnaise sauce of a later period was, of course, unknown to him. A point that EVELYN strongly insisted upon was the composition of the salad-bowl. To pour an acetous dressing into a metal bowl, whether silver or pewter, was an outrage in the eyes of this authority upon salad-making. The only possible bowl to use, he averred, should be one of "porcelaine or of Holland Delft Ware."

EVELYN's list of admissible "saladings" exceeded GERARD's many times, and included daisies (blossoms and leaves), gillyflowers, nasturtiums, thistles, vine tendrils, tulip bulbs, daffodil buds, &c.

To come down now to modern salad-making. Everyone knows what a welcome accessory salads are—green and otherwise—to the dinner or supper table, and given a light hand and some sense of artistic arrangement, they are very little trouble to prepare. A popular delusion is abroad that salads can only be obtained in the summer-time when green food is plentiful, whereas any kind of vegetables, raw or cooked, may be added or substituted in their proper season, and the result is still called by the catholic name of salad.

We have in these days narrowed our list of salad-herbs very materially, and the foundation ingredients for salad-making are now obtained chiefly from lettuce, endive, chicory, cress, water-cress, corn salad, sorrel, spinach, and cucumber, but to any of these may be added cooked potatoes, cooked cauliflower sprigs, celery, beetroot, tomatoes, chives, cooked asparagus tips, cooked artichoke bottoms, cardoons, mushrooms, cooked peas, and cooked beans, the whole being frequently fortified in these days of non-flesh diet by nuts, cheese, eggs, and pulses, or by meat-eaters with flaked cooked fish and finely shredded meat, cooked game, or poultry.

Salads vary according to the fashion of different countries. A true French salad consists of but one kind of vegetable in addition to the herbs used, whilst a Russian salad is noted for its variety of mixed vegetables. The following is a recipe for a typical French salad:—

Remove all the outer leaves of two good cos- or three cabbage-lettuces, and cut off the stalks quite close, and wash in cold water. Dry them well after draining them thoroughly in the salad-basket and break up the leaves small. Now beat together in a basin four tablespoonfuls of best olive oil, with two tablespoonfuls of either plain Orleans wine or tarragon-vinegar wine, and a good pinch of black pepper and salt to taste. Then lay in the lettuce, and turn it well about in the mixture, adding a little very finely-minced green spring onions or chives, and very little chopped green tarragon and chervil. Keep tossing it altogether till the salad has absorbed the dressing, and is equally saturated with it. Then lift it out of the basin and put it into the salad-bowl containing a piece of toasted bread which has previously been rubbed over with a cut clove of garlic. This salad is called *Salade Romaine* if cos-lettuce is used, and *Salade de Laitue* if

cabbage-lettuce is used. Endive, sometimes, called chicory, salad is made in precisely the same way.

In the average English household, however, there is still room for enterprise in the matter of salads. Whether or not we intend to remain, as the French cook says, a "one-sauce people," we are certainly in great measure a "one-salad people," and even more a "one-salad-dressing people." The most popular salad in this country is, no doubt, the lettuce salad, that is to say, lettuce forms by far the chief ingredient of an English salad. Indeed, a salad in the English style would not be recognized without its proper proportion of lettuce. Yet variety in both salads and dressings can be obtained with but little greater expenditure of time or money.

There are certain directions in the preparation of salads which nobody can afford to despise who would rise high in the art of salad-making. First and foremost it is absolutely essential that in preparing green salad every leaf should be most carefully washed and thoroughly drained. This is best effected by placing the leaves, after they have been picked and washed and divided into convenient pieces, into a wire salad basket, or by folding them in a clean cloth and shaking well without crushing or bruising them. Where moisture remains on the leaf the oil dressing will not stay, the mixture is ineffective, and the salad is spoiled. Long soaking in water should be avoided.

Next in importance to the dryness of the salad is the injunction never to let the leaves be touched by a steel knife. They must be torn or broken by the fingers, or cut with a bone, ivory, or silver knife, and then tossed into the bowl in which the dressing has already been mixed.

The question of the salad-dressing is of equal importance to that of the salad. Oil and vinegar supply all that is really necessary as a salad-dressing. The more elaborate mixtures sometimes substituted often detract from, rather than add to, the excellence of a salad. Many English people are prejudiced against the use of oil, but that is because of the poor qualities upon the market and the high price of good oil as compared with the Continent. Only the purest olive oil should be used, or, failing this, good nut oil, for the salad itself is cheap enough, and so deserves a careful selection of the adjuncts. The same with the vinegar. Avoid cheap vinegars, which are in reality nothing but pyroligneous acid, and get pure wine vinegar, as this proves the best for salads. Vinegar ought literally to be *vin-aigre*. Malt vinegar does not usually make good salads. Lemon juice is frequently used by those who object to vinegar. A little cider added with the vinegar is considered an improvement by many.

Sydney Smith, who is often quoted in connexion with salad-making, settled the proportions of salad-dressing years ago as three tablespoonfuls of oil to one of vinegar; and, as for the mixing, one is reminded of the old Spanish saying which advises salad-makers to be a spend-thrift with the oil, a miser with the vinegar, a wise man with the salt and pepper, and a madman with the mixing. The necessary salt and

pepper should be dissolved in the vinegar before the oil is added. If oil is very strongly objected to, it can of course be omitted and a dressing made of the vinegar only, seasoned with pepper, salt, and castor sugar to taste, varied occasionally with salad cream. Finely shredded bacon fried crisp and mixed with salad is also admitted as a good substitute for oil. The cheaper salad-dressings are composed mainly of oil, vinegar, mustard, and milk, varied by hard-boiled yolk of egg and a little cream, the richer or mayonnaise dressings being made with raw yolks and the usual concomitants. Vinaigrette sauce is sometimes substituted, consisting of vinegar, oil, and chopped gherkins, capers, parsley, and shallots.

In conclusion, for those who would fain pursue the subject of salads more intimately, I would recommend them to study the compilation of M. SUZANNE, who is an authority upon the varieties of the modern salad. Every possible variation upon the theme finds its place in his book, which contains over two hundred salad recipes.

Not so long ago I came across an article on salad cultivation in this country, which showed that French lettuces are much superior to English, and our salad cultivation was severely criticized. This is scarcely surprising, as anyone who has given the smallest consideration to the matter must admit that this class of market-gardening in England is much behind the French. The salads which reach our markets from France are all carefully grown on tiers of platforms or ledges at some distance from the ground, and under shelter, mostly of glass, being thus kept safe from incursions of slugs, as well as protected by other means against the attack of all insects whatsoever. They are carefully and neatly packed, and come to market in perfect condition, thus giving little trouble to the cook when falling under his or her hands. French cos- or cabbage-lettuce is decidedly more tasty and tender than the English product. It may be worth while for English salad-growers to study the French system of cultivation.

A FEW SIMPLE SALAD RECIPES.

Lettuce Salad.

Trim and wash thoroughly three cabbage- or two cos-lettuces, drain them well, and break the leaves into convenient-sized pieces. Prepare a dressing with finely chopped garden cress, tarragon, chervil, three yolks of hard-boiled eggs rubbed through a fine sieve, three tablespoonfuls of salad oil, one of wine vinegar, and a little French mustard. Work all until smooth, and add to the lettuce. Mix carefully, and serve.

Mixed Salad.

Trim two cabbage-lettuces and one endive, rinse in cold water, drain them thoroughly, then break the leaves into small pieces and put them into a salad bowl. Place some finely shredded celery and slices of cooked beetroot neatly arranged on the top. Season with salt and pepper, and with salad-dressing mixed with a small quantity of cream in addition to the usual ingredients.

Tomato Salad.

Cut some firm ripe tomatoes into slices, lay them in a salad bowl with a few thinly cut rings of Spanish onion; sprinkle over with chopped parsley, season with salt and pepper and a pinch of castor sugar. Dress with oil and tarragon or wine vinegar. Serve with a bottle of salad-dressing. The onion may be omitted if not cared for.

Potato Salad.

Cut some cooked potatoes into thin slices, put them in a salad bowl, mix with one part of vinegar, two of salad oil, a little chopped chives and parsley, a small quantity of chopped capers, and season with salt and pepper. Mix carefully so as to incorporate all the seasoning without breaking the potatoes. Dish up and serve.

NOTE.—The best potato salad is made with potatoes when they are still warm. A little hot stock added with the dressing is considered an improvement by many.

Banana and Walnut Salad.

Peel and cut into slices four to six ripe but firm bananas, place them in a basin, and mix carefully with half a pint of peeled walnut kernels divided into small pieces. Season with salt and pepper to taste, and besprinkle with the juice of half a lemon. Range this neatly in a salad bowl, surmounted with a neat border of watercress, previously washed, picked, and drained; in the centre of the salad pile one or two large tablespoonfuls of mayonnaise dressing, and send to table.

French Salad Dressing.

Put a teaspoonful of mixed mustard into a bowl, add half a teaspoonful of castor sugar, one teaspoonful of salt, and a good pinch of black pepper; add gradually three tablespoonfuls of salad oil and one tablespoonful of vinegar, and stir until the ingredients are thoroughly mixed.

THE ALPINE GARDEN AND THE NATIVE FLORA OF LE LAUTARET.*

By Miss F. A. WELBY, F.R.H.S.

THE Alpine Garden or *Alpinum* is no new idea. In the sixteenth century CHARLES DE L'ECLUSE (Clusius), who botanized extensively in the Austrian Alps, transplanted many alpine species to his garden at Vienna. To him horticulture owes the Auriculas, derived from a hybrid (*Primula pubescens* = *P. Auricula* × *P. hirsuta*) which he discovered in the Tyrol. After cultivating them at Vienna, he despatched them in 1852 to Belgium, whence they quickly spread to France, England, and Germany.

Again, more than three centuries ago, RICHER DE BELLEVAL, who, under Henri IV., founded the Botanical Garden of Montpellier, devoted a corner to "la Montagne," of which traces are still visible.

Before 1769, *Arabis alpina* was cultivated along with *Anemone narcissiflora*, *Hedysarum obscurum*, and other alpine flowers by KRANTZ, an Austrian botanist. Of his numerous failures, he remarked: "Perit in hortulo, translata sacpius." At the same epoch LINNÆUS expressed admiration and astonishment at seeing *Draba alpina* cultivated in the Jardin Académique of Leyden.

Yet, while in the seventeenth and eighteenth centuries strenuous efforts were made to introduce exotic plants into parks and botanic gardens, there was no attempt at forming a *representative* collection of alpine plants as such.

DE CANDOLLE was the first who, in 1817, when the Botanical Garden of Geneva was started, set apart a space for alpine species, but it was not till 1865 that the famous "rocailles" were formally instituted. In 1835 GOTTWALD and LORENZ collected all the flora of the Austrian Alps, at Lilienfeld, in the valley of the Traise (Basse-Autriche) and planted them on a terraced rock-work. In 1837, when the Botanical Garden of Zürich was founded, an "alpinum" was planted on a rocky spur, which was much enlarged and reorganized in 1879 by OSWALD HERB, who did excellent work on the glacial flora of Switzerland. From 1846 KERNER aspired to repeat the experiment of Lilienfeld, but only achieved his wish when in 1860 he became Professor of Botany at Innsbruck and Director of the Botanical Garden. This collection is still one of the finest in Europe. The Munich "alpinum" was instituted in 1860.

All these are *rock-gardens*—i.e. "a collection of plants from the high mountains, exiled to the plains, forced to flower when their kindred in the Alps are still sleeping under the snow, subsequently

* This article is in part a transcript, by permission, of "Les Jardins Alpines et leurs Buts," by Professor MIRANDE (Grenoble, 1911), and "Les Jardins Alpines," Professor LACHMANN (Grenoble, 1904).

exposed to perish beneath the burning heat of summer, the abundant rains of autumn, the intense cold of winter." It follows that the plants become modified in structure and function, since it is practically impossible to provide them with the environment of high altitudes—"the dew to moisten their roots, the fresh air to bathe their organs, the intense solar radiation which incites the functions of nutrition and enhances the colour of the flowers, the mantle of snow that preserves them from the rigours of winter."

For many reasons it seemed advisable to establish true alpine gardens *in the Alps*, and this, like the rock gardens in the plain, was first undertaken by professional botanists.

In 1875 NÄGELI, Professor at Munich, pointed out the practical and scientific value of gardens in the High Alps. To agriculture at high levels they are as invaluable as experimental farming has proved to be in the plains. They aim at preserving, utilizing, and improving existing vegetation, at cultivating barren spots, at producing new forms adapted to an alpine climate, at introducing others experimentally selected from those of value in the plain.

On the other hand, such gardens assist the study of the alpine flora, of the variability and fixity of species, and their adaptation to climate, the conditions (altitude, temperature, humidity, light, &c.) under which they live. They are invaluable in the *protection* of plants. Many alpine species are rapidly dying out. The very agricultural improvements named above are fatal to innumerable flowers. M. LACHMANN, pleading for the magnificent Lautaret flora, points out that the meadows are now mown annually instead of every two years as formerly, so that an infinity of plants are cut down before their seeds have time to ripen. Nowadays the pastures are improved by irrigating the dry slopes, draining the hollows, manuring everywhere, which creates new environmental conditions. Many species of plants are unable to adapt themselves to this new *régime* and die out rapidly. Again, of the 220 species which constitute the ordinary alpine pasture, only 10 are excellent for forage, 70 are good, 60 medium, all the rest are weeds, *mauvaises herbes*! Such "weeds" are all the Ranunculaceae; all the Orchids, Scrophulariaceae, Gentians, Polygalas; most of the Cruciferae, *Arnica*, and many other Composites, Narcissi, St. Bruno's Lilies, Murtagon Lilies—above all, Edelweiss. Sooner or later they must be exterminated. Some of the Mont Cenis pastures already present a sad contrast to the enamelled meadows of Lautaret: "Graminaceae, with sundry Leguminosae and a few of the Umbelliferae, which make good hay, predominate. This crop is tall and fine, and is much sought after for military forage."

Still more fatal are the *sheep*. As DR. LEVIER remarks, "Forty generations of vandal botanists and exterminators of rare plants would never equal the harm caused in a single year by this four-footed razor"!

For all these reasons the *Association pour la protection des plantes* was founded at Geneva in 1883 by M. HENRY CORREVEON, "the man

who has best served the cause of alpine botany and alpine gardens by his pen, his words, and his actions." This Association strives to check the commerce in plants torn up on the mountains, and recommends culture by seed and rational acclimatization. The alpine gardens created by its initiative cultivate the plants most asked for, and provide seeds of acclimatized plants at prices below those of commercial dealers or even gratuitously. The plants which are dying out find a refuge in these gardens. The same work is carried on by the *Société austro-allemande pour la culture et la protection des plantes alpines*, founded in 1900 under the auspices of M. CORREVON.

PART II.

We may turn now to the subject of this article, the Alpine Garden on the Col du Lautaret, Dauphiné. Lautaret, said to mean "le haut-arrêt," crowns the col leading from Bourg d'Oisans to Briançon, with a large hotel, which is open all the year round, at an altitude of 6,790 feet.

As a botanical area, it includes the space bounded by the Trois Evêchés, the col and peaks of the Galibier, the Ponsoinière, the course of the Petit-Tabuc, and of the Romanche as far as Villard-d'Arènes, and the central mass of Mont Combeynot. Within this space there is every variety of botanical station: meadows, pastures green or rocky hills, dry summits, sunny lawns, streams flowing in all directions, marshes, valleys. The magnificence of its flora is legendary; it is the classical *terra alpina* of botanists. In May, as the snow melts, Crocuses and Soldanellas spring up everywhere, along with the etiolated shoots of *Ranunculus*, *Narcissus*, and *Anemone*. These turn green almost as one watches them, and soon the ground is covered with sweet-scented *Narcissi* resembling a very delicate *N. poeticus*—? *N. radiiflorus*—its peculiarity being that it is frequently of a distinct sulphur colour; *Anemones* (*A. alpina* with very few of *A. sulphurea*, *A. narcissiflora* and *A. vernalis* in abundance, more rarely *A. baldensis*); orchids (*O. maculata*, *O. sambucina*, *O. globosa*, and the delicious *Nigritella angustifolia*); *Myosotis*; *Gentians* (*G. alpina* [acaulis] v. *Kochiana*, *G. bavarica* [or, as I was told, *aestivalis*], and less frequently *G. verna*); *Primula farinosa* and *Ranunculus pyrenaicus*, with a wealth of charming *Androsaces* (*A. obtusifolia*, *A. carnea*, and another much disputed form not unlike *septentrionalis*, said to be a hybrid of *carnea* and *obtusifolia* and to have lately received the name of *Briançonis*); *Drabas* (*D. aizoides* and *D. cuspidata*), and lastly the brilliant little yellow flower which has so many synonyms, *Aretia Vitaliana*, *Androsace Vitaliana*, *Douglasia Vitaliana*, *Gregoria Vitaliana*, *Primula Vitaliana*! Higher up are *Lloydia serotina*, *Primula graveolens*, and *P. viscosa*; along the Romanche, St. Bruno Lilies, *Aquilegia alpina*, *Atragene alpina* (the violet "clematis"), and many others. *Eritrichium nanum* lurks among the boulders, fallen, it is supposed, from higher levels. The

peasants, disregarding the rarer treasures, fill their aprons or baskets with the mountain pansies (*Viola calcarata*), of which, when dried, they make a calming *tisane*. The slopes in June are violet with these charming flowers, of which many are also the less common white and cream varieties.

The horizon is bounded on every side by snow mountains close at hand like the Glacier de l'Homme and the Grand Galibier, or across the distant Briançon valley in the direction of Monte Viso. Troops of lean sheep toil up daily on their way to the higher pastures. They have travelled from the distant Atlas Mountains and Morocco, by Algeria to Marseilles, where the peasant proprietors of Le Monétier buy them up to fatten for the Paris market. The best pastures on the col, however, are rigorously preserved for hay, and are not mown till August, so there is a constant succession and immense range of alpine flowers.

As early as 1894 Professor LACHMANN conceived the notion of an alpine garden on the Lautaret, and applied for a grant to the Minister for Public Instruction and the Minister for Agriculture, while the Minister of Public Works conceded gratuitously a piece of State land close to the hotel. The grant was refused, but M. BONNABEL, proprietor of the hotel, paid the expenses in 1896 and 1897 of clearing and laying out the ground, and fenced it in the next year. In 1899 the garden was planted. At this time it contained rocks and turf, a bit of the natural pasture, some borders for bulbs and shrubs, and a kitchen-garden for the use of the hotel. Its principal and characteristic feature was the systematic collection of 532 plants characteristic of the flora of the Alpes occidentales.* In 1903 the laboratory was instituted. M. LACHMANN, however, tried to maintain two other similar gardens at Chamrousse and at Villard d'Arène, and when M. MIRANDE succeeded him in the Chair of Botany at the University of Grenoble in 1908 he found that all the available funds would be swallowed up in necessary repairs to the latter, both of which had come to grief from a variety of reasons. M. MIRANDE therefore decided to concentrate on the Lautaret Garden. Nearly three quarters of the space available remained to be utilized, while the "natural pasture" had to be given up, since all the native alpine plants were stifled by a rank growth of *Adenostyles*, *Tussilago Farfara*, and *Heracleum Sphondylium*. The kitchen-garden too was definitely installed outside the barrier. To quote from M. MIRANDE's latest publication, *Les Jardins Alpine et leurs Buts* (Grenoble, 1911): "The garden is now arranged in the following divisions: first comes a rocky slope in imitation of a valley, close to which a stream flows into a little basin. This part is specially intended for the flora of the Lautaret. Another large tract is devoted to the flora of the Western

* The Western Alps contain over seventy species not found in the Central or Eastern Alps, e.g. *Saxifraga florulenta*, *S. lantoscana*, *S. valdensis*, *Carduus auroscius*, *Daphne Verloti*, *Gentiana Burseri*, *G. Rostani*, *Geum heterocarpum* (of which Mont Seuse, near Gap, is the only French locality; it also occurs in Spain), *Potentilla delphinensis*, found only in six to seven localities of Dauphiné.

Alps in general, and includes the systematic collection, which is all that remains of the original plan. The rest of the garden is divided into eight regions, each consisting of rockwork allotted to the following localities:—

1. Jura. 2. Pyrenees. 3. Mountains of Mediterranean region. 4. Caucasus and Oural. 5. Eastern Alps, Carpathians. 6. Himalaya, Tibet, Altaï, Siberia. 7. Arctic regions. 8. Various mountains.

In 1910 and 1911 these were all planted with seedlings raised in the plain, or already existing in the garden. There are now 2,000 species in a flourishing condition.

It is necessary to maintain a gardener for the five months of the year (June to October), during which the garden is free from snow. He must, of course, be a specialist, skilled in rock gardening and in the cultivation of alpine plants.* Day-labourers are also required, and it is amusing to find that the "casuals" who are pressed into the service are of much the same kidney as in this country. One tramp, after working two days at five francs, gave up the job, "because he found the stones too heavy to carry, and preferred his liberty on the highroad to work"!

It is further essential to have a *reserve garden* in the plain. Progressive acclimatization is necessary, and seeds and seedlings prove the most satisfactory. Sowing in pots again is preferable to sowing in the open, and this is best done in the plains. The University of Grenoble, however, has no garden attached to it—not so much as a terrace for its pots. By the kind offices of Professor WILCZEK the University of Lausanne allowed Lautaret (1908-9) to share with the Thomasia garden (near Bex) a piece of ground in which alpine seeds could be sown. Then in 1910 a tiny garden was hired just outside Grenoble, which served as a nursery for alpine seedlings, and an experimental ground for students. The Director of the Jardin des Plantes, Grenoble, has given valuable aid by advice and materials, tools, &c., to this venture, but the rent and upkeep fall on the Faculty of Botany. There are no funds for a gardener, save an occasional day-labourer. This year some six hundred species of plants have been transported from the nursery garden to the Lautaret. These alone would have cost over 1,000 francs, and justify the upkeep of the reserve garden.

To sum up, the objects of the Jardin du Lautaret are both scientific and practical. It is capable of becoming a highly important station for the comparative and regional study of alpine flowers, and a valuable means of preserving such species as seem all too likely to die out. It has already a large trade in the despatching of alpine seeds and young, acclimatized plants; in 1909, 3,000 packets of seeds were sent out to all the principal Universities and Botanical Gardens of the world.

The Laboratory would repay development: it already has the

* The present very capable gardener is M. Robert Volut, of Grenoble, to whom I am indebted for much help and information.—F. A. W.

nucleus of a botanical library, regional maps, a herbarium of the Western Alps and of Lautaret in particular, containing over 2,000 plants, a microscope, and all the reagents and other necessities for systematic study. There is also some valuable meteorological apparatus.

For all this, funds and a separate endowment are wanted. Professor ROMANES contributed liberally towards the Linnaea Garden in 1893; and it is greatly to be hoped that English horticulturists will come forward and embrace this new occasion for aiding and securing the development of such an important alpine station.

It is proposed to hold the third Congress of Alpine Gardens at the Lautaret, under the presidency of Prince ROLAND BONAPARTE, in August 1912, which offers a most favourable opportunity for visiting this lovely spot, and judging at first hand of the claims and advantages of its mountain garden.

We are greatly indebted to Professor MIRANDE, of the Grenoble University, for the illustrations accompanying this article.



[Photo: Prof. Mirande]

FIG. 89. GENERAL VIEW OF THE ALPINE GARDEN OF JE LAUTARET.

(To face p. 312.)



(Photo: Prof. M. M. M.)

FIG. 90.—THE ALPINE GARDEN OF LE LAURIERET AS SEEN FROM THE CHALET.



Photo: Prof. Miranda.

FIG. 91.—PORTION OF THE ALPINE GARDEN OF LE LAUTARET REPRESENTING THE PYRENEES.



(Photo: Prof. Armand.)

FIG. 92.—PORTION OF THE ALPINE GARDEN OF LE LACTARET REPRESENTING THE HIMALAYA, TIBET, ALTAI, AND SIBERIA

ORIGIN AND HISTORY OF OUR GARDEN VEGETABLES AND THEIR DIETETIC VALUES.*

By REV. PROFESSOR G. HENSLOW, M.A., F.L.S., V.M.H.

V. SALAD HERBS.

CRESS, BITTER.

THIS, one of our commonest weeds in gardens, &c., is a small annual member of the family Cruciferae, *Cardamine hirsuta*, L., and like all members of this family it is perfectly wholesome. It has been cultivated and improved, so is now used as a salad plant. It is allied to the Cuckoo-flower or Lady's Smock (*C. pratensis*, L.).

CRESS, GARDEN.

No one appears to know for certain whence the garden cress (*Lepidium sativum* of Linnaeus, who gives no locality) came. M. A. de Candolle, after having exhausted his researches, thinks, by an "assemblage of more or less doubtful facts [statements?], that the plant is of Persian origin, whence it may have spread into the gardens of India, Syria, Greece, and Egypt."

Dioscorides said that the herb came from Babylon, and Pliny adds that in Arabia it is said "to attain to a size that is quite marvellous." It was cultivated for its seed, and used as a dried herb under the name of *Cardamon* by the Greeks, and *Nasturtium* by the Romans—the former name on account of its good influence upon the heart (*kardia*), and the latter because of its pungent odour, causing one to make a wry face or "nose-twisting," as *nasitortium* implies. Hence, in the sixteenth century it had the name in France of *Nasitort*.

It occurs in Middle Age vocabularies as *Cæse* (tenth century), *Kersens* or *Cressens* (thirteenth century), *toncarsyn* (i.e. town-carsyn) (fourteenth century).

Pliny records numerous complaints for which cress was used, as it was valued only as a medicinal plant.

In the sixteenth century we find it used as a salad plant. Thus Dodoens observes: "Cresses eaten in sallet with lettuce is of vertue like to rocket and good amongst cold hearbes." We see here how it, like many other plants, passed from purely medicinal to culinary uses, as salads. Gerard also observes (1597) that "Galen saith that cresses may bee eaten with bread *veluti obsonium* [i.e. as food (especially fish) that was eaten with bread], as the Lowe Countreimen many times do, who commonly use to feede of cresses with bread

* Previous articles in this series have appeared as follows:— Vol. xxxiv., pp. 15-23; vol. xxxvi., pp. 115-126, 345-357, and 590-595, and vol. xxxvii., pp. 108-114.

and butter. It is eaten with other sallade herbes as Tarragon and Rocket; and for this cause it is chiefly sowed."

It is not known when the *seedlings* were first eaten as now, and not the herb more fully grown. There were smooth and crisped-leaved sorts, both broad-leaved and narrow-leaved.

CRESS, WATER.

This plant was regarded as a kind of *Sisymbrium* by Dioscorides. His commentator, Matthioli, calls it *S. aquaticum*, "being endowed with the same taste as our *Crescio*," or the "cultivated nasturtium" (1574). The French called it *Cresson de ruisseau*. Hence came our English name; but in the sixteenth century it was also called "Water-Kars."

Its use was at first wholly medicinal, being subsequently recommended in salads. Linnæus retained the generic name *Sisymbrium*, calling it *S. Nasturtium*, but Robert Brown restored the latter name to generic rank, adding *officinale* as the specific name, so that it became *Nasturtium officinale*.

Professor Church observes of the water-cress, "The dietetic value cannot be judged of by the proportion or amount of organic nutrients present, as it depends mainly upon the quantity of mineral matters, aromatic oil, and other minor ingredients."

CORN SALAD OR LAMB'S LETTUCE.

This plant is a member of the Valerian family, *Valerianella olitoria*. It is found in corn-fields and hedge-banks, and has been long used as a salad plant. Thus Gerard (1597) writes:—"These herbes grow wilde in the corne fields, and since it hath growne in use among the French and Dutch strangers it hath bene sowed in gardens as a sallad herbe. It is with pleasure eaten with vinegar, salt and oil, as other sallads be, among which it is none of the worst."

At the present day it is more used on the Continent than in England. A golden-leaved variety is cultivated. M. de Candolle thinks that it is truly indigenous only in Sardinia and Sicily, as no name is traceable in Greek and Latin authors, or in the Middle Ages. In fact the cultivation of it appears to be comparatively modern.

CHICORY AND ENDIVE.

These names correspond to the two species *Cichorium Intybus*, L. (fig. 93), and *C. Endivia*, L. (fig. 94). The former is a native, especially on calcareous soils, of England, and wild in Europe, West Africa and east North-West India; the endive is still found in the corn-fields of Egypt. They were probably two of the plants included in the "bitter herbs" of the Israelites, for they belong to the tribe *Cichoriaceae* of Composites, characterized by a very bitter milky juice, as in the dandelion and other allies.

The chicory is a tall plant with large blue flowers borne on a wiry

stem, and "runcinate" leaves, *i.e.* having the marginal lobes pointing downwards, as in the dandelion, whereas the leaves of the endive are large, oval, and merely toothed on the margin.

The chicory was called *scris* by the ancient Greeks, and *Intubum* by the Romans. This word appears to have been corrupted to *hindeb* in Arabic and "endive" in English. Though looked upon as a medicinal herb, Pliny observes that "the wild endive has certain refreshing qualities, and is used as an aliment." Ovid also mentioned it as a salad plant.

Having been originally introduced into Europe from Egypt, it spread as a garden herb from Italy, and was first received in England



FIG. 93.—WILD CHICORY.

before 1548, when Turner speaks of two sorts of *Intybus*, the cultivated and the wild. "The former is the white and garden endive; the wild also has two sorts, *cichorium* and the dandelion." Other writers of the sixteenth century describe the crisped-leaved as well as the broad- and narrow-leaved varieties. The former resembles the wild form of Egypt to-day, the latter our wild runcinate species.

These differences are due to the nature of the soil and climate, just as the horseradish, dandelion, &c., vary greatly in the form of the leaf according to the soil in which they grow. At the present day *C. Intybus* is cultivated in Paris under the name *Barbe de Capucin*, and consists of elongated, very narrow leaves, being little else than the mid-rib, which is blanched. Witloof, or Brussels

chicory, is derived from the variety with broader leaves. M. H. L. de Vilmorin* remarks, "It is noticeable that in all leaves developed in darkness the rib seems to attain its normal size, while the leaf-blade itself is greatly reduced in breadth. This fact is particularly striking in Witloof, where the head seems to be made up almost entirely of the imbricated leaves." He adds, "The entable part of Witloof is



FIG. 94.—WILD ENDIVE.

4 to 5 inches long, not quite 2 inches across, in the shape of the head of a small cos lettuce; it is almost pure white, very solid and firm."

Messrs. Sutton's 'Combination' or Christmas Salad has the interior leaves *runcinate* and the outer *enfire*, forming a combination of *Barbe de Capucin* and Witloof.

Endive, notwithstanding its being blanched, retains a good deal of its bitterness. "It contains in 100 parts: 94 of water, 1 of albuminoids, 1 of sugar, 2 of starch, &c., and 0.8 of mixed matter," so that it has no nutrient value of any consequence.

CUCUMBER.

Cucumis sativus is now believed to be the cultivated form of *C. Hardwickii*, Royle, wild from Kumoon to Sikkim. It has been cultivated in India for some three thousand years, and spread westwards. The Greek name was *sikuos*. Pliny describes the Italian fruit as "very small," probably like our "gherkin"; the same form

* *Saladings* (JOURNAL R.H.S., 1890, March 25, p. 260).

is figured in herbals of the sixteenth century, but "those grown in some of the provinces are remarkably large and of a wax colour or black"; by this Pliny means dark green. Gardeners to-day speak of black mint in the same sense. He describes their long shape and adds, "If hung in a tube while in blossom the cucumber will grow to a most surprising length."

Pliny tells us that the cucumber was so great a favourite with the Emperor Tiberius that he raised beds made in frames upon wheels by means of which the cucumbers were moved and exposed to the full heat of the sun, while in winter they were withdrawn and placed



FIG. 95.—COMMON CUCUMBER, FROM GERARD'S HERBAL.

under the protection of frames glazed with "mirror-stone," probably a thin layer of selenite, a crystallized form of gypsum, which can be split into thin translucent slices.

Gerard (1597) so described the cucumber: "the fruit is long, cornered, rough, and set forth with certaine bumpes or risings, wherein is contained a firme and solide pulpe or substance, transparent or thorow shining; which together with the seede is eaten a little before they be fully ripe." His illustration (fig. 95) of the plant shows cucumbers like our young gherkins.

The dietary value is practically nothing, there being upwards of 96 per cent. of water.

DANDELION.

This familiar wild flower (*Taraxacum officinale*, Web.) is now cultivated and blanched for saladings. It has long been regarded as a

useful drug and still is included in existing Pharmacopœias. It does not appear to have been grown as a salad plant till quite modern times.

The Dandelion (from *dens leonis*, lion's tooth, in reference to the leaf) was called *Caput monachi* or "prestis croune" in the fourteenth century. Linnaeus named it *Leontodon Taraxacum*. As it is widely spread over north and south temperate regions, it was probably, with endive, one of the "bitter herbs" of Scripture. A very small and starved variety grows on the rocks and walls of Valetta in Malta.

LETTUCE.

Several plants were included under the name *Lactuca* by the Romans, and the Greeks distinguished several kinds of *thridar* and *thridakine*, as they called the lettuce; though the Latin name appears to be derived from the Greek word *galaktouchos*, "having milk." This is the characteristic feature of the section of Composites known as *Cichoriaceae*, to which the dandelion, lettuce, chicory, &c., belong. The ancients recognized several varieties in colour—black, brown, white, purple, red and blood-red—but whether they all belonged to our garden lettuce is doubtful. This is believed to have been derived from the species *L. Scariola*, L., a rare British plant, but widely distributed over Europe, and Siberia, to the Himalayas.

Pliny refers to the "crisped" and a "squat" variety, probably like our cabbage lettuce. These were known as *crispa* and *capitata* in the sixteenth century, and have been grown ever since. "Lettuces contain but little nutriment of any kind except mineral salts, especially nitre. . . . A small quantity of sleep-producing substance, called *lactucarin*, is found in the stem." (Church.)

MUSTARD.

We have two species of mustard, the white (*Brassica alba*, Boiss.), with yellow seeds, and the black, with brown ones (*B. nigra*, Koch), both being indigenous. To these Pliny adds a third, probably *B. erucoides*, L., the "rocket-leaved" mustard. He thus describes mustard: "It has so pungent a flavour that it burns like fire, though at the same time it is remarkably wholesome for the body, the leaves being boiled as those of other vegetables." The reader will recall the references to mustard in the Gospels. With regard to these Dr. W. M. Thomson, in his book, *The Land and the Book*, observes: "I have seen this plant on the rich plain of Akkâr as tall as the horse and his rider." The black mustard grows in the hedges, &c., near St. Ives, Cornwall, quite five feet in height.

The only culinary use in the sixteenth, seventeenth, and eighteenth (to 1730, Tournefort) centuries was as "sauce" with vinegar to "help digestion." In the fourteenth century it was known as "*Senevy*," probably a corruption of *Sinapis*, the old Latin name. In a recipe for the palsy we read: "Take barley-bred and no outhier, and ete potage

that is made of *Seneuge*, that ys an herbe that men maketh mostard ther-of,"

Mixed with vinegar it was used as a mustard plaster by the ancients for the stings of serpents and scorpions. "The pungent essential oil is not produced till the ground seeds are wetted." The ordinary condiment is derived from the black mustard, as "the seeds of *B. alba* do not yield a pungent oil, but only a non-volatile rubefacient." (Church.) Many acres of the yellow-seeded mustard (*B. alba*) are, however, cultivated for Messrs. Colman near Wisbech.

PURSLANE.

Portulaca oleracea, L., is a very widespread little fleshy-leaved plant with minute yellow flowers. It spreads itself on the surface of the ground, but there is a variety with an upright stem. Both are cultivated in Europe. It is occasionally grown in England as a salad-plant or for pickling. There are three varieties, known as the green, golden, and large-leaved golden. Gerard (1597) figures the "wild" with small leaves and the "garden" purslane with much larger ones. Besides its medicinal uses, he says it was "much used in sallads with oile, salt and vineger."

SAMPHIRE.

The samphire (*Crithmum maritimum*, L.) on the rocks round our coasts was known to the Greeks as *Krithmon* or *Krithamon* and as *Crithmum* to the Romans. The English name is derived from St. Pierre—i.e. St. Peter's herb. This was corrupted into "sampier" (sixteenth century); thence into "samphire." It was probably so called from growing on rocks, *petra* being the Greek for rock and *petros* a stone. Turner, an early writer of the sixteenth century, says it was first used as medicine "sodden in wine," then "both raw and sodden and eaten as a worte or a common mete herb, that is eaten in sallet or otherwise. It is kept in bryne."

Other herbalists of the same century repeat the above uses. The marsh samphire (*Salicornia herbacea*) of our salt-marshes is sometimes substituted for the true samphire, but it is much inferior. Its main use was for making barilla, an impure carbonate of soda, obtained by burning the dried plant.

SORREL.

This was called *Oxalis* or *Acetosa* in the sixteenth century, but now is regarded as a species of dock, *Rumex Acetosa*, L. Besides its medicinal uses, Gerard observes: "The juice in summer-time is a profitable sauce in many meates and pleasant to the taste. It mooveth appetite to meate. The leaves may be sodden and eaten in manner of a Spinnach tart or as meate." Since the French sorrel, *R. scutatus*, was introduced the British species has fallen in repute, for the former has more succulent leaves. Paxton, in his *Botanical Dictionary*, gives 1596 as the year of its introduction.

TOMATO.

This now familiar fruit is produced by *Lycopersicum esculentum*, Tourn., one of ten species, natives of South America, mainly Peru. It has been introduced into many warm countries, arriving in Europe in the close of the sixteenth century (1596). M. A. de Candolle shows, from a total absence of all knowledge of the tomato in Asia, that it could not have been a native of that continent; on the other hand, all positive evidence points to Peru, and the small-fruited *L. cerasiforme*, wild on the Peruvian shore, is the most probable origin of it.

The peculiar ribbed form of the fruit first grown in this country was due to a malformation called a "multifold" flower, in which the usual number of parts is much augmented. Modern cultivators now grow the normal globular form.

AN INDEX TO ILLUSTRATIONS OF PEARS.*

Compiled by E. A. BUNYARD, F.R.H.S.

NOTE.—To the works cited in the Index of Apples (pp. 152 to 174) must be added,

Le Jardin Fruitier du Muséum. J. Decaisne, 1858-68.

This work deals largely with Pears. The plates are of the highest perfection, and the accurate drawing, colouring, and suggestion of texture are not approached by any other work that has come under our notice. The fruits, foliage, and current year's wood are figured.

ABBREVIATIONS.

Abbreviations used.	Full title.	Author.
Bivort . . .	Album de Pomologie . . .	Bivort.
Decaisne . . .	Le Jardin Fruitier du Muséum . . .	Decaisne.
Duham. . . .	Traité des Arbres Fruitiers . . .	Duhamel.
Fl. Pom. Fran. . .	Flora et Pomone Française . . .	St. Hilaire.
Her. Pom. . . .	Herefordshire Pomona . . .	Bull and Hogg.
Hort. Trans. . .	Transactions of the Royal Horti- cultural Society . . .	—
Hov. Fr. Am. . .	Fruits of America . . .	Hovey.
Knight	Pomona Herefordiensis . . .	Knight.
Knoop	Pomologia	Knoop.
Kraft	Abhandlung von der Obstbaumen . .	Kraft.
Lauche	Deutsche Pomologie	Lauche.
Lyons	La Pomologie de la France . . .	—
Lind. Pom. Brit.	Pomologia Britannica	Lindley.
Mac. Fl. Pom. . .	Flora and Pomona	Mackintosh.
Mag. Pom. . . .	Magyar Pomologia	Molnar.
Mayer	Pomona Franconica	Mayer.
New York . . .	The Apples of New York	Beach.
Noisette	Le Jardin Fruitier	Noisette.
Pom. Belg. . . .	Annales de Pomologie Belge et Etrangère	—
Pom. Ital. . . .	Pomona Italiana	Gallesio.
Pyr. Brent. . .	Pyrus Malus Brentfordiensis . .	Ronalds.
Sickler	Der Deutsche Obstgärtner . . .	Sickler.
Svensk Pom. . .	Svensk Pomona	Eneroth.
Verger	Le Verger	Mas.

* An "Index to Illustrations of Apples" will be found at pp. 152-174.

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- — Knoop, 2.
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- — Noisette, 29.
- — Kraft, II, 115.
- — Lind. Pom. Brit., III, 120.
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- — Fl. Pom. Fran., I, 32.
- — Noisette, 30.
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- — Verger, I, 34.
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- — Pom. Belg. (1857), 63.
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- — — Fl. Pom. Fran., II, 199.
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- *de Quessoy.* Her. Pom., II, 40.
- — — Noisette, 34.
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- — — Pom. Belg. (1858), 25.
- *d'Ambroise.* Duham., IV, 14.
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- *d'Anjou.* Her. Pom., II, 36.
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- — Pom. Belg. (1859), 61.
- *d'Apremont.* Lyons, 26.
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- — Her. Pom., II, 70.
- — Duham., IV, 17.
- — Hov. Fr. Am., I, 1.
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 — *Duhaume.* Her. Pom., I, 22.
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 — *Easter.* Her. Pom., II, 70.
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 — *de Ghelin.* Verger, III, 128.
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 — *Golden.* Hov. Fr. Am., I, 99.
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 — *Gris.* Pom. Belg. (1855), 35.
 — — Knoop, 7.
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 — — Pom. Belg. (1854), 9.
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 — *Varenne de Fenille.* Verger, I, 33.
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 — — — Duham., IV, 25.
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 — — — *Musqué.* Duham., IV, 26.
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 — — — Pom. Ital., 10.
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 — — Fl. Pom. Fran., II, 123.
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 — *Brun.* Decaisne, I, 30.
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 — Lyons, 115.
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 — — *Motte.* Lauche, II, 99.
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<i>Zephirin Grégoire</i> . Pom. Belg. (1855), 79.	<i>Zimt Kleine Schlesische</i> . Sickler, XVI, 15.
— — Lyons, 102.	<i>Zucker Graue</i> . Sickler, XIII, 16.
— — Verger, III, 71.	— <i>Hollandische</i> . Sickler, XI, 7.
— <i>Louis</i> . Bivort, III, 103.	— <i>Kleine Gelbe Sommer</i> . Sickler, XV, 16.
— — Pom. Belg. (1856), 95.	— <i>Rothfarbige Sommer</i> . Lauche, II, 100.
— — Verger, III, 174.	— — — Sickler, X, 8.
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ILLUSTRATIONS OF PYRUS SPECIES.

NOTE.—Decaisne's work mentioned above contains also plates of the following species of *Pyrus*:—

<i>P. Balansae</i> , t. 6.	<i>P. malifolia</i> , t. 32.
<i>P. betulaefolia</i> , t. 20.	<i>P. Michauxii</i> , t. 16.
<i>P. Bourgaeana</i> , t. 2.	<i>P. nivalis</i> , t. 21.
<i>P. Boveana</i> , t. 10.	<i>P. oblongifolia</i> , t. 14.
<i>P. cordata</i> , t. 3.	<i>P. parviflora</i> , t. 13.
<i>P. elaeagrifolia</i> , t. 17.	<i>P. Pollwilleriana</i> , t. 31.
<i>P. glabra</i> , t. 11.	<i>P. salicifolia</i> , t. 12.
<i>P. Jacquemontiana</i> , t. 8.	<i>P. sinaica</i> , t. 15.
<i>P. Kotschyana</i> , t. 18.	<i>P. sinensis</i> , t. 5.
<i>P. longipes</i> , t. 4.	<i>P. syriaca</i> , t. 9.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

XII.—POLLINATION IN ORCHARDS.—I.

By F. J. CHITTENDEN, F.L.S.

AMONG the many factors upon which fruitfulness of orchard trees depends, cross-pollination is, as a rule, of first-rate importance. It is now known that a large number of apples, pears, and plums are self-sterile,* i.e. they fail to set fruit unless their flowers are pollinated with pollen from another variety of the same kind of tree.

Self-sterility is a widespread phenomenon in the vegetable kingdom,† for which we have at present no adequate explanation, but when it occurs in annuals, e.g., *Papaver Rhoeas*, it appears sufficient if pollen is transferred from the anthers of one plant to the stigma of any other; but with apples, pears, and plums the case is different. The trees of any variety of apple, pear, or plum, though in some sense individuals, yet, since they are all derived by vegetative propagation from one original stock, are, from another point of view, all parts of one individual: they retain the same innate characters as those possessed by the original from which they were divided, and their protoplasm is directly derived from the protoplasm of their common parent; it is not the result of the combination of two masses of protoplasm, as it usually is in the case of a plant growing from a seed. The transference of the pollen from a flower on one tree to a flower on another tree of the same variety is, therefore, practically equivalent to transferring it to another flower on the same tree, and it is followed by no more result in the one case than in the other. Cross-pollination must, as a rule, be possible between trees of different varieties if fruit is to be produced.

This necessity seems to have been first definitely discovered in America‡ for pears, and later the facts were found to apply also to apples.§ It has been known in a more or less vague way in this country for some time, though not as widely as it should be. Though the general fact is clearly established, detailed knowledge of the behaviour

* The term "self-sterile" is used in this paper in a rather loose sense for want of a better one. It implies as used here, inability to form fruits without the aid of pollen from another variety. In a more accurate sense it would imply inability to form fertile seed without the aid of foreign pollen. Some varieties of pears and apples will produce fruits containing no seeds, and these are therefore self-fertile in the first sense and not in the second; such varieties have been called by EWERT in *Die Parthenocarpie oder Jungfernfruchtigkeit der Obstbäume* (1907) "*parthenocarpic*," a term applied to similar cases by SOLACOLU in 1905 (*Comptes Rendus*).

† See, for instance, FOCKE, "Ueber Unfruchtbarkeit bei Bestäubung mit eigenem Pollen" in *Abhandlungen herausgegeben vom naturwissenschaftlichen Vereine zu Bremen*, xii., pp. 409-416, where a list of fifty-seven self-sterile plants is given, a number that might now easily be added to. *Pyrus salicifolia* and *Mespilus nigra* are there included.

‡ See WAITE, *Pollination of Pear Flowers* (U.S.A. Dept. Agr., Div. Veg. Path., Bull. 5, 1895).

§ WAITE (*U.S.A. Dept. Agr., Year Book*, 1898, pp. 167-180).

of different varieties is at present not at all plentiful. The present writer carried out in 1902-03 some experiments in Essex, the results of which were reported in this JOURNAL,* and which showed that a comparatively small proportion of the apples and pears tested were capable of setting fruit without the intervention of pollen from another variety.

Since then some few experiments have been carried out in this country and on the Continent on the matter, and a considerable number in America. It is not established, however, that any variety behaves in the same way in this respect throughout the whole of its range; indeed, the contrary has been stated. It is very desirable, therefore, that extended experiments should be carried out in this country with a view to settling some of the points at issue, for the whole matter is one not only of intense scientific importance, but of great practical interest as well.

So far as our knowledge at present goes it appears that the pollen of any other variety of apple is capable of inducing fruit to form on any self-sterile variety of apple. It may subsequently be found that when pollen of a certain variety is available a greater number of better fruits is produced by a certain other variety; some not very convincing evidence has been brought forward in American publications in support of this idea.

Experiments are being carried out at Wisley, where the trees are now of such an age, size, and vigour that they are likely to yield reliable results, and the following is the first of a series of papers designed to deal with the experiments and observations made. It treats of the relative time of flowering of apples at Wisley and compares the observations made there with others of a similar nature made elsewhere.

Instances might be readily multiplied of cases where large blocks of one variety of apple or pear had been planted, and when the trees had reached bearing age the observation had been made that while the trees round the outside of the block had borne well, those towards the inner part had borne but poorly, or not at all, in spite of the freedom with which they flowered. Or, again, instances have been frequently brought to our notice of solitary apples or pears planted in a garden which have failed to fruit though flowering well every year. In many instances the remedy in the former case has been found by cutting-over and re-grafting trees here and there in the block with a distinct variety, and in the latter by planting in proximity to the hitherto solitary one, a tree of a different variety of the same kind.

It is obvious that if any other variety will be efficient as a pollen provider *there is a greater chance of success if varieties flowering at the same time be intermixed.* It is usually sufficient if, say, four rows of one variety are followed by one row of the variety designed to provide the pollen, and this by four rows of the main variety again. It is possible that pollen would be carried to a greater distance than four rows from the pollen-producer, but it is better to err on the safe side.

* See vol. .xxvii. (1902), p. cxc., and vol. xxviii. (1903), p. clxi.

The following lists* are intended to serve as a guide as to what varieties may be expected to flower at approximately the same time. In addition to the chances of pollination being greater, there are other and obvious advantages, such as facilities for spraying, and so on, attached to simultaneous flowering periods in a block of fruit trees.

Time of Flowering of Apples.—The time of flowering of apples varies between rather wide limits, both as to its commencement and as to the period over which the flowering continues. It commences in south-east England about the third week in April in early years, and continues into the second week in June in late years. During the four years 1908-1911 in which records have been kept at Wisley, our earliest apple to open, 'Red Astrachan,' was in full bloom† in 1910 on April 21; in 1911, May 2; in 1909, May 3; and in 1908, May 7; while the most consistently late-flowering variety 'Royal Jubilee' was in full flower in 1908 on May 23; in 1909, May 17; in 1910, May 20; and in 1911, May 19.

The period during which one variety or other of apple was in full flower (ignoring the few days, about seven or eight, before, and the few, about eight or nine, after full flowering time, during which some flowers were open) was, in 1908, 18 days (May 6 to May 23); in 1909, 20 days (May 3 to May 22); in 1910, 35 days (April 21 to May 25); and in 1911, 18 days (May 2 to May 19).

Reference to the table in this JOURNAL (vol. xxxvi., p. 560), drawn up by Mr. C. H. HOOPER from the records at Wye, will show that the average time apple trees continue in flower is about eighteen days, while the time of "full flowering" is reached about the seventh day from the opening of the first flower. It is, therefore, obvious that generally the whole of the flowers of the earliest flowering variety of apple will scarcely have fallen before the latest ones commence to bloom. Probably, other things being equal, varieties that continue long in flower would be more likely to be reliable fruit-bearers than those which continue in flower for only a short time. Reliable particulars upon this point are, however, difficult to obtain, for the weather, the age and size of the tree, and the nature of its surroundings, greatly influence the duration of its flowering. More important is the relative order of flowering.

Relative Times of Flowering.—As is to be expected no absolutely definite order in flowering time is observable among the different varieties of apples. It is no uncommon thing to find one branch of a tree some days in advance of or behind the rest in flowering, while sometimes adjacent trees of the same variety may reach full flowering several days apart, e.g., at Wisley, in 1909, one tree of 'D'Arcy

* The lists may also serve as a guide to those who are fortunately situated in districts where late spring frosts are unknown, for such late-flowering varieties may be selected as will bloom at such a time as renders them likely to escape frosts altogether. Such selection would be unavailing at Wisley where late spring frosts occur every year at about the time the latest apples are in flower.

† That is, about 50 per cent. of the flowers were open: the same meaning being attached to the expression wherever used in connexion with Wisley observations.

'Spice' was in full flower on May 10, the next not until May 20; one of 'Devonshire Quarrenden,' in 1910, was in full flower on April 30, the other on May 2; one of 'Early Rivers,' in 1908, was open full on May 12, but the next not until May 20, and so on. These marked differences in trees of the same variety growing so near together are difficult to account for. They are not constant, however, for in each of the instances mentioned, in some other year the two would be found in flower at the same time.

Again, we are not justified in saying any particular variety will be certain to occupy a definite position in time of flowering relative to other varieties. Whereas, as pointed out above, 'Red Astrachan' is on the average the first in full flower, in some years its position is disputed by another variety, such as 'Early Peach.' In the same way the position of 'Royal Jubilee' at the end of the list is often assailed.

In spite of these minor aberrations it is possible to divide the varieties into early-flowering varieties, mid-season varieties, and late-flowering, some in each group in some seasons trespassing across the boundary line into the adjacent one.

In the following list we have arranged the varieties growing in the Wisley Garden in order according to the average date of full flowering for the four years over which observations have been made. The number before the name in each case indicates the average number of days at which the variety reached full flowering after the earliest-flowering variety had reached that stage in each year, the earliest variety being reckoned as 1. These numbers are, for the most part, greater than would be the case in most seasons, owing to the inclusion of the dates for 1910, when the flowering-period was spread over an abnormally long time. This abnormal year does not, however, affect the *relative* order of flowering, as given, to any serious extent.

The figures are, in almost every case, based on observations made upon two trees of the same variety standing side by side in the plantation. In a few cases three or four trees growing close to one another were used, and in a very few only one.

AVERAGE ORDER OF FLOWERING AT WISLEY.

1 $\frac{1}{2}$ Red Astrachan.	Gold Medal.
4 $\frac{1}{2}$ Manks Codlin.	7 $\frac{1}{4}$ White Juneating.
5 $\frac{1}{2}$ Braddick's Nonpareil.	7 $\frac{3}{4}$ Egremont Russet.
5 $\frac{3}{4}$ Golden Spire.	Brownlee's Russet.
5 $\frac{3}{4}$ Early Peach.	7 $\frac{1}{2}$ Belle de Boskoop.
6 $\frac{1}{4}$ Tower of Glamis.	Stirling Castle.
6 $\frac{1}{2}$ White Transparent.	8 Devonshire Quarrenden.
6 $\frac{3}{8}$ Duchess of Oldenburgh.	8 $\frac{1}{2}$ Early Rivers.
6 $\frac{3}{4}$ Gravenstein.	*Irish Peach.
Lady Derby.	8 $\frac{5}{8}$ St. Edmund's Pippin.
6 $\frac{7}{8}$ Margil.	Wagener.
7 Keswick Codlin.	Bietigheimer Red.

* This is too low in the list owing to flowering poorly in 1911.

- | | | | |
|------------------|------------------------|------------------|----------------------------|
| 8 $\frac{5}{8}$ | Summer Golden Pippin. | | Beauty of Bath. |
| 9 | Cardinal. | | Hambling's Seedling. |
| 9 $\frac{1}{4}$ | Lord Suffield. | 12 $\frac{1}{8}$ | King of Tompkins County. |
| | Ribston Pippin. | | Calville Blanche. |
| 9 $\frac{3}{8}$ | Christmas Pearmain. | 12 $\frac{1}{4}$ | Blue Pearmain. |
| | Hoary Morning. | 12 $\frac{3}{8}$ | Golden Reinette. |
| 9 $\frac{3}{4}$ | Byford Wonder. | 12 $\frac{1}{2}$ | Allington Pippin. |
| 10 | Domino. | | Pitmaston Russet Nonpareil |
| | Landsberger Reinette. | | Cockle Pippin. |
| | Washington. | 12 $\frac{3}{8}$ | Calville Bois Bunel. |
| 10 $\frac{1}{8}$ | Warner's King. | | Hubbard's Pearmain. |
| 10 $\frac{1}{4}$ | Endsleigh Beauty. | 12 $\frac{1}{4}$ | Queen Caroline. |
| 10 $\frac{3}{8}$ | Ben's Red. | | Scarlet Pearmain. |
| 10 $\frac{1}{2}$ | Calville des Femmes. | | Belle Dubois. |
| 10 | D'Arcy Spice. | 12 $\frac{3}{8}$ | Beauty of Kent. |
| 10 $\frac{3}{8}$ | Old Nonpareil. | 13 | Cellini. |
| | Fraise d'Hoffinger. | | Mannington's Pearmain. |
| | Kerry Pippin. | | St. Martin. |
| 10 $\frac{3}{4}$ | Baumann's Reinette. | | Worcester Pearmain. |
| | Norfolk Beauty. | | Lord Derby. |
| | Striped Beefing. | 13 $\frac{1}{8}$ | Ecklinville Seedling. |
| | Sturmer Pippin. | | Seaton House. |
| | Pearn's Pippin. | | Wyken Pippin. |
| 11 | Lord Hindlip. | 13 $\frac{1}{4}$ | Allen's Everlasting. |
| 11 $\frac{1}{8}$ | Winter Quarrenden. | | Winter Greening. |
| 11 $\frac{1}{4}$ | Belle de Pontoise. | 13 $\frac{1}{2}$ | Beauty of Stoke. |
| | Biel's Borodawka. | | Calville Malingre. |
| | Duchess's Favourite. | | James Grieve. |
| | Frogmore Prolific. | | Langley Pippin. |
| | Hanwell Souring. | | The Queen. |
| | Prince Edward. | | Rival. |
| | Scarlet Nonpareil. | 13 $\frac{5}{8}$ | Bedfordshire Foundling. |
| | Yellow Ingestrie. | | Peck's Pleasant. |
| | Yorkshire Greening. | 13 $\frac{3}{4}$ | Alfriston. |
| 11 $\frac{1}{2}$ | Minchal Crab. | | King of the Pippins. |
| | Watcombe Hero. | | Lady Sudeley. |
| 11 $\frac{3}{8}$ | Bismarck. | | Peasgood's Nonesuch. |
| | Ross Nonpareil. | | Norfolk Beefing. |
| | Winter Hawthornden. | 13 $\frac{7}{8}$ | Wealthy. |
| 11 $\frac{3}{4}$ | Leopold de Rothschild. | 14 | Stone's Apple. |
| | Claygate Pearmain. | 14 $\frac{1}{4}$ | Grantonian. |
| | Colonel Vaughan. | 14 $\frac{1}{2}$ | Blenheim Orange Pippin. |
| | Hoarmead Pearmain. | | Hawthornden. |
| 11 $\frac{7}{8}$ | Cox's Orange Pippin. | | September Beauty. |
| | Lord Grosvenor. | | Waltham Abbey. |
| | Roundway Magnum Bonum. | 14 $\frac{3}{4}$ | Normandy Pippin. |
| 12 | Charles Ross. | | Lane's Prince Albert. |
| | Duke of Devonshire. | 14 $\frac{7}{8}$ | Barnack Beauty. |
| | Early Victoria. | 15 | Bowhill Pippin. |

Cornish Gilliflower.	Melon Apple.
Mrs. Barron.	Golden Noble.
15 $\frac{1}{4}$ Werder's Golden Reinette.	Emperor Alexander.
Diamond Jubilee.	16 $\frac{3}{8}$ Annie Elizabeth.
Grenadier	16 $\frac{1}{2}$ Thomas Rivers.
15 $\frac{3}{8}$ Calville Rouge.	Lord Burghley.
Foster's Seedling.	Mrs. Phillimore.
Pott's Seedling.	16 $\frac{3}{8}$ Calville Rouge Précoce.
15 $\frac{1}{2}$ Livermore Favourite.	Lewis Incomparable.
15 $\frac{5}{8}$ Chelmsford Wonder.	16 $\frac{3}{4}$ New Hawthornden.
Bramley's Seedling.	17 Newton Wonder.
15 $\frac{3}{4}$ Dumelow's Seedling.	Williams' Favourite.
Reinette de Canada.	17 $\frac{1}{8}$ Northern Greening.
Twenty Ounce.	Red Juneating.
16 Hollandbury.	17 $\frac{1}{2}$ Herefordshire Beefing.
Lady Henniker.	18 Winter Majetin.
Paroquet.	Mère de Ménage.
Cox's Pomona.	18 $\frac{1}{8}$ Surprise.
Christie Manson.	18 $\frac{1}{2}$ Mother.
Royal Late Cooking.	Pine Golden Pippin.
16 $\frac{1}{2}$ Rambour Papelin.	19 Sandringham.
16 $\frac{1}{4}$ Mr. Gladstone.	19 $\frac{1}{2}$ Court Pendu Plat.
Gascoyne's Scarlet.	20 $\frac{1}{8}$ Royal Jubilee.

It is to be clearly understood that this "average order of flowering" represents only approximately what is likely to happen in any particular year, but it is believed that it is sufficiently accurate to serve as a guide as to what varieties are most likely to be in flower at the same time. One might take any of a dozen above or below any particular variety for planting with it to furnish pollen, with the certainty that any one of those varieties would sufficiently approximate its full-flowering period to the one chosen.

COMPARISON OF ORDER OF FLOWERING OF APPLES AT WISLEY WITH THAT IN OTHER LOCALITIES.

It is very desirable to ascertain whether an observed order of flowering in one locality is approximately accurate for another. With this object in view a comparative Table has been drawn up, the authorities consulted being as follows, the title used at the head of the columns in the Table being placed first:—

1. *Wisley, Surrey.* Records of flowering in the fruit plantation for years 1908-1911.

2. *Sawbridgeworth, Herts.* A MS. list kindly furnished by Mr. H. SOMERS RIVERS, covering the two years 1909, 1910.

3. *Woburn, Bedfordshire.* Data taken from "The Blossoming of Apple Trees," by The DUKE OF BEDFORD, K.G., F.R.S., and S. U. PICKERING, M.A., F.R.S., in *Twelfth Report of the Woburn Experimental Fruit Farm* (1910) pp. 35-51, covering the five years 1905 to 1909.

4. *Wye, Kent.* Observations made by Mr. C. H. HOOPER, M.R.A.C., in 1908, and published in *Journal of the Board of Agriculture*, vol. xv. (1908) pp. 683-686; see this *Journal*, vol. xxxvi. p. 559.

5. *Herefordshire.* List drawn up for the year 1894 by Mr. JOHN WATKINS at the Pomona Fruit Farm, Hereford, published in *Year-book, Herefordshire Fruit Growers' Association*.

6. *Victoria, Australia.* Taken from "Sterility in Fruit Trees," by E. WALLIS, in *The Journal of the Department of Agriculture of Victoria*, ix. (1911), pp. 10-19, and relating to several districts in Victoria in 1910.

7. *New York, U.S.A.* A number of observations made in New York, not exactly comparable with one another, as they were made with varying numbers of trees, and not always in the same year, but no doubt approximately accurate. From "The Relation of Weather to the Setting of Fruit; with Blooming Data for 866 Varieties of Fruit." *U.S.A. Exp. Stn. Geneva, New York*, Bull. 299; March 1908. By U. P. HEDRICK.

8. *Oregon, U.S.A.* Records made in 1907-8 in the College Orchard, Oregon, by C. I. LEWIS and C. C. VINCENT, published in *U.S.A. Exp. Stn., Oregon*, Bull. 104; February, 1909.

9. *Virginia, U.S.A.* The average of varying numbers of observations on the flowering time of apples extending over about ten years to 1904 given by H. L. PRICE in "Meteorological Data and Bloom Notes of Fruits," *U.S.A. Exp. Stn., Virginia*, Bull. 155; May, 1905.

It is somewhat difficult to make exact comparisons between these lists, because they do not all deal with the same varieties nor even start with the same earliest flowerer and end with the same latest.

Further, in several of the lists, unlike our own, which gives the time when about half the flowers are fully out and when probably there is the greatest chance of fruit setting, the date of the opening of the first flower is used as a basis of comparison. This seems scarcely so reliable a basis as that adopted in our own lists, since not infrequently one flower opens some time before the bulk; on the other hand the method removes the "personal factor" in the record. This difference may slightly interfere with the order in the various lists.

We have thought it best for purposes of comparison to divide the time from the earliest date given to the latest in each list into four almost equal periods, and to arrange the varieties in four groups, numbered respectively 1, 2, 3, 4, beginning with the earliest. In the Table the sign - or + following a number means the flowering time was near the beginning or near the end of the period named respectively. These figures in the following Table therefore represent the order of flowering in the respective localities, and the degree of uniformity they show is to a large extent a measure of the reliability of a list drawn up in one locality as a guide to the planter in another. The varieties are given in alphabetical order, and those of purely foreign interest, which do not appear in either of our English lists, are omitted.

TABLE COMPARING THE ORDER OF FLOWERING OF APPLES IN DIFFERENT LOCALITIES.

	Wales, Surrey	Sawbridge- worth, Herts.	Woburn, Bedfordshire	Wye, Kent	Herefordshire	Victoria, Australia	New York, U.S.A.	Oregon, U.S.A.	Virginia, U.S.A.
Adam's Pearmain	...	2	...	1	3-4	...	...	...	...
Alfriston	3	3	...	2	2	...	...	...	...
Allen's Everlasting	3	3	3-	3	...	...	...	...	...
Allington Pippin	3-	3	...	3	3	...	...	...	...
Annie Elizabeth	4-	3+	3	...	4	...	...	...	2
Amorel	...	...	4	...	...	...	...	...	...
Aromatic Russet	...	...	...	...	1-	...	...	...	...
Barnack Beauty	3	3	...	...	3	...	...	...	...
Baumann's Red Winter Reinette	2	2+	...	2-	3	...	...	...	...
Baxter's Pearmain	...	3+	2	3	3-	...	...	...	...
Beauty of Bath	3-	2	2	2	1	...	4	...	...
Beauty of Hants	...	3	3	...	...	...	...	...	...
Beauty of Kent	3-	3	2	2	2+	...	...	...	...
Beauty of Stoke	3	3	2	...	...	...	...	...	...
Bedfordshire Foundling	3	3	3	...	...	...	...	...	...
Belle de Boskoop	1+	...	...	3	...	...	...	...	...
Belle de Pontoise	2+	3	3	3	...	...	...	...	...
Belle Dubois	3-	...	3	3	...	...	...	...	...
Ben's Red	2	...	...	...	4+	...	...	...	...
Bess Pool	...	...	...	...	...	...	...	...	...
Betty Geeson	...	3+	...	3	...	...	...	...	...
Biel's Borodawka	2+	...	...	...	...	...	...	...	...
Bietigheimer Red	2-	1	2	1	3-	...	...	...	...
Bismarck	2+	3	3	3	2	...	...	...	...
Blenheim Orange	3	3+	...	...	3-	...	...	...	...
Blue Pearmain	3-	...	...	2-	...	...	...	...	...
Boston Russet	...	3	...	...	...	...	...	...	...
Bowhall Pippin	3+	...	...	...	...	...	...	...	...
Brabant Bellefleur	...	...	...	3	...	...	...	...	...
Braddick's Nonpareil	...	2	2	2-	1+	...	...	...	...
Bramley's Seedling	...	2+	3	2	3	...	...	...	...
Brownlee's Russet	...	2-	2	2	1+	...	...	...	...
Buckingham	...	3	...	...	...	...	...	...	...
Byford Wonder	...	...	3	2-	2	...	...	...	...
Calville Blanche	...	3+	...	...	3-	...	...	...	...
Calville Bois Bunel	...	3-	...	...	3-	...	...	...	...
Calville des Femmes	...	2	...	...	2	...	...	...	...
Calville Malingre	...	3	...	2	3	...	...	...	...
Calville Rouge	...	3+	...	3	...	...	...	...	...
Calville Rouge Précoce	...	4-	...	...	4	...	...	...	...
Cardinal	...	2	2	...	2	...	...	...	...
Catshead	...	...	...	3	3	...	...	...	...
Cellini	...	2	3	...	2+	...	...	...	...
Charles Ross	...	3	...	1	...	...	...	...	...
Chelmsford Wonder	...	3+	3	...	...	...	...	...	...
Christie Manson	...	4-	...	...	...	...	...	...	...
Christmas Pearmain	...	2	2	2	...	...	...	...	...
Claygate Pearmain	...	2+	2	...	3	...	...	...	...
Cockle Pippin	...	3	3	...	...	...	...	...	...
Coe's Golden Drop	...	2	...	...	...	...	...	...	...
Colonel Vaughan	...	2+	...	3	...	...	...	...	...
Cornish Aromatic	...	3+	...	...	...	...	...	...	...
Cornish Gilliflower	...	3+	...	3	...	...	...	...	...
Court Pendit Plat	...	4+	4+	4+	2+	...	...	...	...
Cox's Orange Pippin	...	2	3	2	3-	...	...	...	...
Cox's Pomona	...	4-	3	...	3	...	...	...	...

* For one year only.

	Witley, Surrey	Sawbridge worth, Herts.	Woburn, Bedfordshire	Wye, Kent*	Herefordshire*	Victoria, Australia	New York, U.S.A.	Oregon, U.S.A.	Virginia, U.S.A.
Crimson Queening	...	3	...	...	...	...	...	...	...
D'Arcy Spice	2	2	3	2	2+	2	...	...	...
Devonshire Quarrenden	2	2	2	...	...	...	...	...	...
Diamond Jubilee	3+	...	...	...	...	2	...	...	...
Domino	2	2	2	...	...	1+	...	...	1+
Duchess's Favourite	2+	...	2	2-	2-	...	...	...	...
Duchess of Oldenburg	1	1	1	1	1	1	2	1	1
Duke of Devonshire	3	3+	4	3	3	2	...	...	...
Dumelow's Seedling	3+	3	2	3	3	...	2	3+	...
Dutch Mignonne	...	2+	2	3	...	...	...	...	...
Early Julyan	1	3	2	...	2	...	...	...	...
Early Peach	1	1	2	...	...	...	...	...	...
Early Rivers	2	2	2	...	...	...	...	2	...
Early Strawberry	...	2	...	...	...	2+	...	...	...
Early Victoria	3	2	...	...	...	...	...	...	...
Eckinville Seedling	3	2	3	3	...	2+	...	...	...
Egremont Russet	1	4	2	2	1+	2+	...	...	...
Emperor Alexander	4	2+	2	2	3	2	3	2	2
Endleigh Beauty	2	...	2	...	...	...	...	...	...
Fearn's Pippin	2+	2+	2	2	2	...	...	...	...
Flanders Pippin	...	...	4	...	...	...	...	...	...
Flower of Kent	...	...	...	2	...	...	...	...	...
Foster's Seedling	3+	...	...	3	...	...	...	...	...
Fraise d'Hofinger	2	2	...	...	...	...	...	...	...
Frogmore Prolific	2	2+	3	...	2+	...	...	...	...
Galloway Pippin	...	3+	...	...	...	...	...	...	...
Gascoyne's Scarlet	4	...	4	3	4	...	...	...	...
Gold Medal	1+	2	2	...	...	...	...	...	...
Golden Noble	4	...	4	3	3	...	...	...	...
Golden Pippin	...	3	...	...	...	...	...	...	...
Lewis Incomparable	4	...	...	...	...	...	...	...	...
Livermore Favourite	3+	...	...	...	...	...	...	...	...
London Pippin	...	...	...	3	...	4	...	...	...
Lord Burghley	4	...	...	...	...	...	...	...	...
Lord Derby	3	...	3	3	3	...	...	...	...
Lord Grosvenor	2+	2-	2+	...	2	...	...	...	...
Lord Hindlip	2+	...	...	...	...	...	...	...	...
Lord Suffield	2	2	3	2	2	...	...	...	...
Mabbot's Pearmain	...	3	3	...	...	...	...	...	...
Maltster	...	...	2-	...	1	...	...	...	...
Nannington's Pearmain	3	3	3	...	3	...	...	...	...
Manks Codlin	1	1+	2	1	1	...	...	...	...
Margil	1	2+	2	...	3-	...	...	...	...
May Queen	...	...	...	...	...	...	...	...	...
Melon Apple	4	...	...	...	...	...	...	4	...
Mère de Ménage	4	...	3	3	2	...	...	...	...
Minchal Crab	2+	...	...	...	...	...	...	...	...
Mother	4	4	3+	2	4-	...	4	4	4
Mr. Gladstone	4	3	3	1	1+	2	3	...	...
Mrs. Barron	3	...	...	...	...	...	...	...	...
Mrs. Phillimore	4	...	...	...	...	...	...	...	...
Murfit's Seedling	...	2	...	...	2	...	...	...	...
Nancy Jackson	...	3	...	...	...	...	...	...	...
Nelson Codlin	...	3	...	...	...	...	...	...	...
Newton Wonder	4	3+	4	...	3	...	...	...	...
New Bess Pool	...	...	...	...	...	...	...	...	...
New Hawthornden	4	3	3	2	3	...	...	...	...
New Northern Greening	...	...	...	...	...	...	...	...	...
Nonesuch	...	...	2	...	...	...	...	...	...
Norfolk Beefing	3	...	3	...	3	...	...	...	...

Golden Reinette	3-	...	...	...	...	1	...	...	Norfolk Beauty.	2	...	...	...	...	...	...	...	...
Golden Spire	1	2-	1	2	1	...	...	...	Norfolk Wonder	...	...	...	...	...	...	...	...	...
Gospatrik	...	2+	3	...	3	...	...	...	Northern Dimpling	...	...	2	...	...	...	...	...	...
Grand Sultan	...	2+	...	...	...	...	...	...	Northern Greening	4	3	3	...	3	...	...	...	...
Grange's Pearmain	...	...	...	3	...	...	...	...	Okera	...	...	3	2	...	...	...	...	...
Grantonian	3	...	...	...	...	...	...	...	Old Hawthornden	...	...	3	...	...	...	...	...	...
Gravenstein	1	...	2	1	1+	2	1	1	Old Nonpareil	2	...	...	...	...	...	...	...	...
Grenadier	3+	...	3	...	3-	...	...	...	Paroquet	4	...	...	...	...	...	...	...	...
Hambledon Deux Ans	...	...	2	2	2	...	...	...	Pearson's Plate	...	...	...	1	...	...	...	...	...
Hambling's Seedling	3-	...	2+	3	...	...	...	...	Peasgood's Nonesuch	3	3	3	2	3-	3	...	...	...
Hanwell Souring	2+	...	...	...	3	...	2+	...	Peck's Pleasant	3	4	...	...	...	4	...	...	...
Hawthornden	3	3	...	...	...	...	...	...	Pine Golden Pippin	4	3+	...	...	...	...	...	...	...
Hereford Beefing	4	...	...	...	4	...	...	...	Pitmaston Russet Nonpareil	3-	...	...	...	...	...	...	...	...
Herefordshire Pearmain	...	...	3	...	...	...	...	...	Pott's Seedling	3+	...	3	2	2	...	...	...	...
High Canons	...	...	3	...	...	...	...	...	Prince Edward	2+	...	...	...	...	...	...	...	...
Hollandbury	4-	2	...	2	...	...	...	...	The Queen	3	2+	2+	2	2+	...	...	...	...
Hoary Morning	2	...	3	...	3	...	2+	...	Queen Caroline	3-	2-	3-	...	2	...	...	...	...
Hornead Pearmain	2+	3	3-	...	3	...	...	...	Rambour Papelin	4-	...	...	...	...	...	...	...	...
Hubbard's Pearmain	3-	2-	1	1	...	1	...	...	Red Astrachan	1-	1	1	...	1-	2-	3-	1	1
Irish Peach	+	2-	...	...	...	...	...	...	Red Juneating	4	3	3	...	...	...	...	...	...
James Grieve	3	2	...	...	...	...	...	...	Reinette de Canada	3+	3+	3	...	3	3-	2+	3+	...
Jolly Miller	...	...	...	...	...	...	...	...	Reinette Discardre	...	1	...	...	...	...	...	...	...
Kerry Pippin	2	2	2	...	1	...	...	...	Ribston Pippin	...	3	2	1	3-	2	4	...	...
Kewick Codlin	1+	2-	2	...	1	...	...	...	Rival	3	...	...	...	...	...	...	...	...
King Edward VII.	...	4	...	...	...	...	...	...	Rosemary Russet	...	...	2	...	...	...	...	...	...
King Harry	...	...	...	2	...	...	...	...	Ross Nonpareil	2+	...	...	...	...	...	...	...	...
King of the Pippins	3	...	3	3	2+	...	...	...	Roundway Magnum Bonum	2+	2	3-	2	...	...	...	...	...
King of Tompkin's County	3-	2+	...	...	2-	3	...	...	Round Winter Nonesuch	...	...	...	3-	...	...	...	...	...
Lady Derby	1	...	...	...	3	...	...	...	Royal Jubilee	4+	4	4+	4	4+	...	...	...	...
Lady Henniker	4-	3+	4-	3	...	...	...	...	Royal Late Cooking	4-	...	...	...	...	...	...	...	...
Lady Sudeley	3	...	3	2	3+	2	...	...	Royal Snow	...	...	...	2-	...	...	...	...	...
Landsberger Reinette	2	...	2	...	2	...	...	...	Rymer	...	3+	...	3	3	...	...	...	...
Lane's Prince Albert	3	...	3	2	4	...	...	...	St. Edmund's Pippin	2-	...	...	...	...	...	...	...	...
Langley Pippin	3	...	...	...	...	...	...	...	St. Martin	3	...	...	...	...	...	...	...	...
Leather Coat	...	...	2	...	...	...	...	...	Sandringham	4+	...	4+	3	4	...	...	...	...
Leopold de Rothschild	2+	...	...	...	...	...	...	...	Scarlet Golden Pippin	...	3	...	...	...	...	...	...	...

* For one year only.

† See note, p. 353.

	Witley, Surrey	Sawbridge- Worth, Herts	Woburn, Bedfordshire	Wye, Kent	Herefordshire	Victoria, Australia	New York, U.S.A.	Oregon, U.S.A.	Virginia, U.S.A.		Witley, Surrey	Sawbridge- Worth, Herts	Woburn, Bedfordshire	Wye, Kent	Herefordshire	Victoria, Australia	New York, U.S.A.	Oregon, U.S.A.	Virginia, U.S.A.
Scarlet Nonpareil	2+	3	2+	1+	2+	1+	...	...	...	Vicar of Beighton	...	...	...	...	...	...	...	...	...
Scarlet Pearmain	3-	...	3	...	2+	2+	...	...	...	Wadhurst Pippin	...	...	2+	3	4	...	...	...	...
Schoolmaster	...	3	...	...	...	...	...	...	...	Wagner	...	2+	...	1	2	...	2	3	3
Scotch Bridget	...	...	...	...	4-	...	...	...	...	Waltham Abbey	...	...	...	...	2-	...	...	...	...
Scott's Winter	...	...	...	2	...	...	...	3+	...	Warner's King	...	3	2-	2-	2-	...	...	...	...
Seaton House	3	3	...	3	...	...	...	...	...	Washington	...	2	...	1+	...	...	...	...	...
September Beauty	3	2+	2+	2	...	...	2	...	...	Watcombe Hero	...	2	...	...	...	...	...	3-	2
Shepherd's Fame	...	...	...	...	...	...	...	...	...	Wealthy	...	2+	...	...	...	...	...	...	...
Small's Admirable	...	3	...	2	...	...	...	...	...	Werder's Golden Reinette	...	3	2	...	...	...	3	2+	3
Stirling Castle	1+	...	2	2-	2	...	...	...	...	White Juneating	...	1+	...	...	...	...	...	...	...
Stone's Apple	3	3	3	3	3-	3	...	...	...	White Nonpareil	...	2-	...	...	...	...	...	...	...
Striped Beeding	2	...	...	3	3	...	...	...	...	White Transparent	...	1	2	1+	2-	...	...	...	...
Sturmer Pippin	2	2+	2	3	2+	2+	...	...	...	Williams' Favourite	...	4	3	4-	...	2+	...	3	...
Sugar Loaf	...	...	2	...	...	...	...	...	...	Winter Greening	...	3	...	...	...	...	...	...	...
Summer Golden Pippin	2-	...	...	...	...	...	...	...	...	Winter Hawthornden	...	2+	...	...	...	...	...	...	...
Summer Pippin	...	...	...	2	...	...	...	...	...	Winter Majetin	...	4	...	...	...	4	...	...	...
Surprise	4	...	...	...	...	...	...	...	...	Winter Quarrenden	...	2	3	3	...	...	...	...	...
Sutton Beauty	...	2+	...	...	...	...	...	...	...	Winter Quoining	...	2	...	...	...	...	...	...	...
Syke House Russet	...	3	...	...	...	...	...	...	...	Worcester Pearmain	...	3	2	2	...	...	...	...	...
Thomas Rivers	4	...	...	...	...	...	...	...	...	Wyken Pippin	...	3	...	...	4-	...	...	...	...
Tom Putt	...	2+	3-	...	3-	...	...	...	...	Yellow Ingestrie	...	2	2	1+	...	...	...	...	...
Tower of Glamis	1	1	2-	...	...	...	...	...	...	Yorkshire Beauty	...	2+	3	...	3-	...	...	...	...
Twenty Ounce	3+	...	2	2	...	...	1	3	...	Yorkshire Greening	...	...	2	2	...	...	...	...	...
Tyler's Kernel	...	2	3	1	3	...	...	...	...		...	2+	...	...	...	...	...	...	...

* For one year only.

The correspondence in these figures is very general, and particularly where the observations have extended over a number of years. This correspondence is seen not only within the bounds of Great Britain but as far away as Victoria and North America. Some factors tending to disturb the exact correspondence have been pointed out above, but it is evident that in the main apples retain their characteristic earlier or later flowering propensities, and this being so a list made in one locality, provided it is founded upon a sufficient number of observations, is likely to be a generally useful guide in other localities. In any one year there may be a considerable deviation from the average in the actual number of days the flowering of any particular variety occurs after the earliest variety commenced, but with only comparatively slight variations the same relative order will be likely to be followed.

SUMMARY.

1. It is pointed out that many varieties of apples require pollen from flowers of *another variety* in order to produce fruit.
2. Other things being equal, pollen is more likely to be successfully carried if trees flowering at the same time are planted in proximity to one another.
3. The average relative order of flowering of apples grown at Wisley is given.
4. There will be in any one year some deviations from this relative order, but they will usually be slight.
5. It is shown that varieties cultivated in widely different localities in general maintain the same order of flowering.
6. A list drawn up from a sufficient number of observations in one locality will be in general a safe guide for planting in other localities.

XIII.—ON TUMOUR AND CANKER IN POTATO.

By A. S. HORNE, B.Sc.(LOND.), F.G.S.

DURING the period of my study of Potato disease at Armstrong College, Newcastle, I became familiar with the symptoms of the form of disease described by M. C. POTTER* in the *Journal of the Board of Agriculture* for December 1902, as a new potato disease. Each year tubers were planted in the soil used in his original experiments, and in each successive year diseased tubers were obtained in the yield from the infected soil. The organism present in the diseased tissues appeared to agree more closely with that described by SCHILBERSZKY in 1906, under the name of *Chrysophlyctis endobiotica*, than with any other known organism. At the same time there were points in SCHILBERSZKY'S description not strictly in accord with my own observations.

During this period also I was shown on more than one occasion by POTTER misshapen tubers which he had received from T. JOHNSON, of Dublin, affected with the disease named by JOHNSON "corky scab." The microscopic examination of these tubers, however, did not enable me to form a sound judgment as to the nature of the organism supposed to be present in the diseased tissue—an organism which had been identified by JOHNSON as the parasitic Myxomycete, *Spongospora solani*, described by BRUNCHORST† in 1886.

In September 1910 my attention was drawn to a supposed outbreak of "wart disease" in an allotment garden in the neighbourhood of Newcastle-upon-Tyne. The garden was visited and several misshapen tubers were collected and examined. It was then found that the disease was not "wart disease," but equivalent to JOHNSON'S "corky scab." An organism was found in all stages of development (myxamocbæ, "plasmodia," spore-balls, &c.), recalling that described by BRUNCHORST. Almost immediately afterwards, upon visiting some experimental plots at Cleadon which had been planned in connexion with an epidemic of *Phytophthora* in the previous year, I found that all the experimental rows were affected with potato canker. From this source the photographs ‡ which illustrate this paper were obtained.

Soon afterwards, owing to the kindness of Professor J. W. H. TRAIL, of Aberdeen, and Dr. W. G. SMITH, of Edinburgh, I had opportunities of studying the symptoms of potato canker in several localities in Scotland.

It is stated in the *Journal of the Board of Agriculture*§ that "corky scab" (potato canker) is well known to be of old standing in

* M. C. POTTER, *Jour. Bd. Agr.*, ix. (1902), p. 320.

† J. BRUNCHORST, *Bergens Museums Aarstereetning* (1886).

‡ These photographs were taken by Miss Jamieson, the librarian of Armstrong College, Newcastle.

§ *Jour. Bd. Agr.*, xvi. (1909), p. 642.

Great Britain and Ireland and to be widely distributed, and that it has been reported to the Board chiefly from those parts of Great Britain in which "black scab" is present or is suspected; it is further stated that certain knobs and swellings which frequently appear in tubers affected with "corky scab" have been mistaken for the symptoms of "black scab," and they have generally been reported as such. My own experience is that the symptoms of the two diseases have been and are very frequently confused, and this is due to a great extent to the absence of sufficiently detailed information concerning potato canker to enable a fair comparison to be made.

This paper is divided into sections, relating to:—

1. The history of *Chrysophlyctis endobiotica*, Schilb., the organism causing "potato tumour."
2. The history of *Spongospora solani*, Brunch., the organism causing "potato canker."
3. A comparative account of the symptoms of the two diseases.
4. The supposed earlier descriptions of *Spongospora*.
5. Field observations.

I. CHRYSOPHLYCTIS ENDOBIOTICA.

Chrysophlyctis endobiotica. K. SCHILBERSZKY, in *Ber. der Deutsch. Bot. Gesell.* xvi. p. 36 (1896).

Oedomyces leproides (Trabut). G. MASSEE, in *Jour. Bd. Agric. Eng.* ix. p. 307 (1902).

Synchytrium endobioticum. J. PERCIVAL, in *Centr. für Bakt.*, bd. 25, p. 439 (1910).

Synchytrium solani. G. MASSEE, in *Diseases of Cultivated Plants and Trees*, p. 98 and p. 573 (1910).

On July 22, 1902, some diseased tubers sent by Mr. ECKFORD were exhibited before the Scientific Committee of the Royal Horticultural Society. These were referred by the Committee to M. C. COOKE to report upon. His report was furnished at the next meeting on August 5.* He made the following statement: "The cells of the diseased tissue contained subglobose brown bodies (about $25\ \mu \times 20\ \mu$) on hyaline pedicels resembling much the gonidia of *Pythium*. This parasite being quite new to me, and unnoticed in any work to which I had reference, I consulted Mr. MASSEE, who had made a special study of this group, and he at once informed me that the same disease appeared last year near Birkenhead, where it completely destroyed a field of potatoes, and that it evidently was allied to *Pythium*, and had been found in Germany, and called *Chrysophlyctis endobiotica* (SCHILBERSZKY, *Ber. Deuts. Bot. Gesell.* p. 36, 1896). As far as we have been able to discover, this genus has never been described, but seems to be a close ally of *Pythium*, and very similar to the fungus

* M. C. COOKE, *Jour. R.H.S.*, xxvii. (1902), p. cxliv.

which causes beetroot tumour, and known as *Oedomyces leproides* or *Urophlyctis leproides*. Although I did not find them, Mr. MASSEE informs me that the first-formed spores are subglobose, produced at the apex of a hypha, which has a large vesicular swelling just below the spore exactly as in beetroot disease." The disease was given the name of "potato tumour." A short account of this report was published in the *Gardeners' Chronicle* of August 16.* This is the first published record which I have been able to find of the occurrence of *Chrysophlyctis endobiotica* in this country.†

Mr. CHITTENDEN has kindly allowed me to examine an herbarium specimen, given to him by COOKE, of the diseased potato, and there is no doubt that the organism present in the specimen is identical with that known as *Chrysophlyctis endobiotica*. On November 4, COOKE‡ stated that more recently specimens had been sent to Berlin, with the result that MAGNUS had not only confirmed this affinity, but had demonstrated it to be the same species known as *Oedomyces leproides*, Trabut, so that beetroot tumour and potato tumour were caused by the same fungus.

Following close upon these incidents came an article by G. MASSEE§ in the *Journal of the Board of Agriculture* of December 1902. The disease is described under the name of "black scab," and the organism is identified as *Oedomyces leproides*, Trabut. MASSEE, moreover, figures a "spore" similar in every respect to that characteristic of the genus *Urophlyctis*.

Oedomyces leproides was discovered by Trabut in the tissue of beetroot tumours, and described in 1894. This beetroot *Oedomyces* was reviewed, among others, by MAGNUS, in his account of the genus *Urophlyctis*|| published in 1897, and was therein regarded as a typical species of this genus.

A further statement by COOKE¶ appears in the *Gardeners' Chronicle* of March 21, 1903:—"At any rate, it is quite certain that Dr. MAGNUS was acquainted with the beetroot tumour, and we are assured that, upon his examination of specimens of this warty potato disease sent to him from this country, he has pronounced it to be identical with the 'beetroot tumour.'" The words *we are assured* are important since they show that COOKE did not himself send specimens to MAGNUS but relied upon information given him by some one else. COOKE's statement called forth a letter from MAGNUS** to the

* M. C. COOKE, *Gard. Chron.*, xxxii. (1902), p. 124.

† A postcard dated July 28, 1902 (postmark), is preserved among Dr. COOKE's drawings in the Library of our Society, signed 'G. M.', which probably refers to these specimens: "The fungus on potato is *Chrysophlyctis endobiotica* (SCHILBERSZKY, *Ber. Deut. Gesell.*, p. 36, 1896). I have only seen it as British from near Birkenhead last year, where it completely destroyed a field of potatoes."

‡ M. C. COOKE, *Jour. R.H.S.*, xxvii. (1902), p. cxcviii.

§ G. MASSEE, *Jour. Bd. Agr.*, ix. (1902), p. 307.

|| P. MAGNUS, *Annals of Botany*, xl. (1897), p. 87.

¶ M. C. COOKE, *Gard. Chron.*, xxxiii. (1903), p. 187.

** P. MAGNUS, *Gard. Chron.*, xxxiii. (1903), p. 329.

Gardeners' Chronicle of May 23, 1903:—"I have only this moment read that Dr. M. C. COOKE has stated in the *Gardeners' Chronicle* (1903, p. 187) that I have identified the fungus in the warts of potatoes as *Urophlyctis leproides* (Trab.), P. Magnus, which causes the beetroot tumours; but this is a mistake on the part of Dr. COOKE. I have never seen the warty potatoes, which I regret very much, and of course I have written nothing about them. But the description given by R. SCHILBERSZKY in *Berichte der Deutschen Botanischen Gesellschaft*, vol. xiv. (1896), pp. 36, 37; and the description and figures given by Mr. M. C. POTTER in the *Journal of the Board of Agriculture*, vol. ix. December 1902, p. 320, plate iv., seem to me to show that the fungus of the warty potato disease is entirely different from *Urophlyctis leproides* (Trab.) in the beetroot tumours, and belongs apparently to another genus, called by SCHILBERSZKY *Chrysophlyctis*, with the species *Chrys. endobiotica*. I should be very glad to receive material of the warty potato disease, in order that I may study it."

Subsequently MAGNUS received potato material and was able to confirm his view that the organism was not *Urophlyctis leproides* (Trabut), P. Magnus. Hence *Urophlyctis* or *Oedomyces* may be dismissed from further consideration here. During the time that COOKE and MASSEE were occupied with this disease, W. CARRUTHERS,* Consulting Botanist to the Royal Agricultural Society of England, had received diseased potatoes from J. C. BRYNER JONES, obtained from a garden near Dolgelly. These potatoes were handed to Miss LORRAIN SMITH, who reported that the diseased tissue contained an organism belonging to the Chytridiaceæ. This organism resembled very closely SCHILBERSZKY's new Chytridiaceous fungus—*Chrysophlyctis endobiotica*. Miss LORRAIN SMITH felt unable to definitely identify the organism with *Chrysophlyctis* principally because two kinds of spore had been described—resting-spores and swarm-spores; of these she had observed only the former, and, moreover, the dimensions of the spores were not given. Miss LORRAIN SMITH wrote to SCHILBERSZKY in 1902 to ask him if he could identify the organism, but received no reply to her letter.

CARRUTHERS' report for the year 1901-02 ended November 30, 1902. In a footnote he states that "since the article was in print it appears (*Jour. Horticult.*, November 15, 1902, p. 454) that Dr. M. C. COOKE sent specimens of what I believe to be the same disease to Dr. MAGNUS of Berlin for identification." From this it would appear that the original report was ready before November 15; that is, prior to the publication of the December number of the *Journal of the Board of Agriculture*. The report was finally published in the *Journal of the Royal Agricultural Society* for 1902. It also appears that an erroneous impression prevailed that COOKE himself had sent specimens of the disease to MAGNUS for identification.

The third view as to the identity of the fungus in the potato

* W. CARRUTHERS, *Jour. Roy. Agr. Soc. Eng.*, lxiii. (1902), p. 292.

tumour was set forth by M. C. POTTER* in the *Journal of the Board of Agriculture* for December 1902. POTTER definitely describes the organism as *Chrysophlyctis endobiotica*, although there were important discrepancies between his own observations and those of SCHILBERSZKY.

Of the three identifications, there is no doubt whatever that the attitude adopted by Miss LORRAIN SMITH was the scientifically correct one under the particular circumstances of the case. And if contemporaneous observers had exercised a similar caution, there would have been no controversy.

To POTTER, however, belongs the credit of having experimented with the supposed *Chrysophlyctis*, discovering by so doing that soil once infected by the organism became potentially able to bring about infection of the potato plant in successive years. This writer also describes to a certain extent the way in which the tumour is formed.

In 1903 a short description of the disease was written by R. S. MACDOUGALL† from material received from farms in Cheshire in the winter 1902-03, and another by J. W. EASTHAM‡ of Holmes Chapel, in 1904. The disease had been known at Holmes Chapel since 1896. In August 1907 an outbreak in Scotland was recorded by H. W. BORTHWICK.§

Although MAGNUS had pointed out in 1903 that the organism was not *Oedomyces leproides*, this name appeared again in MASSEE's text-book published in 1907.|| The name *Chrysophlyctis endobiotica*, Potter (doubtful of Schilberszky), was used in the *Journal of the Bd. of Agric.* in 1908. In December 1908, however, at a meeting of the Linnean Society of London,¶ he explained that he had observed the germination of the "spores" and that the reproductive bodies of the parasite corresponded closely to those of *Synchytrium*.

In 1909 J. PERCIVAL,** in an article to the *Gardeners' Chronicle* entitled "New facts concerning Warty disease of Potato," stated that he had been able to distinguish two kinds of "spore," and that he had observed the germination of the resting "spores." He stated that his observations led him to believe that the organism belonged to the genus *Synchytrium*. He published a more detailed account of the life-history and cytology in 1910,†† renaming the organism *Synchytrium endobioticum*, Percival.

The observation that the British organism possessed two kinds of "spore," however, removed one of the chief difficulties in establishing the identity with *Chrysophlyctis endobiotica*.

* M. C. POTTER, *Jour. Bd. Agr.*, ix. (1902), p. 320.

† R. S. MACDOUGALL, *Trans. Highland and Agr. Soc. Scot.*, ser. 5, xv. (1903), p. 312.

‡ J. W. EASTHAM, *Year-book, Coll. Agr. and Hort., Holmes Chapel* (1904), p. 11.

§ H. W. BORTHWICK, *Notes R.G.B. Edin.*, xviii. (1909), p. 115.

|| G. MASSEE, *Text-book of Plant Diseases*, p. 453.

¶ G. MASSEE, *Proc. Linn. Soc. Lond.* (1909), p. 6.

** J. PERCIVAL, *Gard. Chron.*, xlvii. (1909), p. 79.

†† J. PERCIVAL, *Centr. f. Bakt.*, bd. 25 (1910), p. 439.

MASSEE, however, in his text-book, published in 1910,* writes that both POTTER and himself were mistaken in their identification of the fungus. He states that he had written to SCHILBERSZKY on the subject, and had received a reply to the effect that the parasite was not his *Chrysophlyctis endobiotica*. He had unfortunately not kept SCHILBERSZKY's reply, and for this reason it cannot be quoted verbatim. MASSEE therefore changed the name to *Synchytrium solani*, Massee.

Owing to the fact that so many conflicting accounts had appeared relative to the supposed *Chrysophlyctis*, Professor J. B. FARMER suggested that a communication be sent to SCHILBERSZKY, together with specimens of diseased tubers and microscopic preparations of the organism, with a view to finally settling the question of identity. Accordingly on February 21, 1911, a letter was sent, but up to the present (November 20, 1911) no reply has been received. It will be remembered that no reply was sent to Miss LORRAIN SMITH's letter of 1902.

It is necessary, therefore, to rely upon SCHILBERSZKY's original, somewhat meagre, description. Meagre as it is, however, and without illustration, I have no hesitation in believing that his organism and the parasite known to be the cause of potato tumour in Great Britain and Ireland are identical. There remains but one apparently serious difficulty. This is concerned, however, with the symptoms of the disease, not the organism. SCHILBERSZKY states that another tuber—not the one from which he obtained his description of the organism—representing an older stage in the progress of the disease, showed signs of corrosion or hollowing-out. This condition does not obtain at all in potato tumour. It is a characteristic feature of tubers attacked with *Spongospora solani*—the canker parasite. It seems highly probable therefore that a potato affected with canker was among those sent to SCHILBERSZKY from Upper Hungary.

There yet remains to be considered the evidence brought forward by PERCIVAL† in favour of the transference of *Chrysophlyctis* to the genus *Synchytrium*. PERCIVAL sums up his position very briefly. He states that the parasite agrees in practically all respects with *Synchytrium*—in “the form of its swarm-spores, its growth within the invaded tissues of the host, the production of sori of sporangia, and the germination of the latter . . . moreover, the cytology of the parasite supports the proposal.” Before going any further it seems advisable to revert for a moment to *Synchytrium* itself, and to set forth the chief known characteristics of the genus. The following types of reproductive bodies have been described:—

1. The sporangium-sorus. A reproductive organ, formed from the vegetative body, which contains a number of sporangia.

2. Resting swarm-sporangia (dauer-sporen). These give rise directly to zoospores.

* G. MASSEE, *Diseases of Cultivated Plants and Trees*, p. 100.

† K. SCHILBERSZKY, *Ber. d. Deut. Bot. Gesellsch.*, xiv. (1896), p. 36.

‡ l.c. p. 444.

3. Resting "sporangia" (dauer sporen). Each gives rise to a sporangium-sorus, which escapes as such from the parent cyst.

The species grouped in the section *Eusynchytrium* possess the first and second of these types; the species within the sub-genus *Pycnochytrium* possess only the third. In *Kryptogamenflora der Mark Brandenburg* four species are recorded under the sub-genus *Eusynchytrium*; of these only *Synchytrium taraxaci* has been fully investigated. The germination of the "dauer sporen" of the remaining three species has not been observed. Since two kinds of spore have been described for *Chrysophlyctis*, a comparison may be made with the *Eusynchytria* and with the only species which has been completely described—*S. taraxaci*. PERCIVAL* states, with regard to the germination of the "resting" sporangium of *Chrysophlyctis*: "In no case was I fortunate enough to see the splitting of the sporangial wall and the escape of the swarmers. The empty ruptured cases, however, were frequently found in drops which had been left six to ten days, and in some instances the inner sacs with their contents were observed free from the outer thick walls, having apparently come out through gaping slits in the latter." Now, in *S. taraxaci* it is stated that the "dauer sporen" give rise to zoospores direct; the escape of a thin-walled sac from the resting cyst is described only in the *Pycnochytria*.

There remains, however, a still more important point, regarding which the information is by no means definite. A prominent feature in the genus *Synchytrium* is the formation of a sorus of sporangia within the parent reproductive body. The number of sporangia formed in each sorus is considerable—in *S. aureum*, 150 to 200; *S. globosum*, about 200; *S. mercurialis*, 80 to 90 or 120. Now PERCIVAL states, with regard to *Chrysophlyctis*: "The parasite, however, produces another type of sporangium, chiefly during May or June. These are thin transparent sacs, either produced singly or two to five together, forming a sorus of sporangia enclosed within a brown coat, which consists largely of the brown altered cell-walls of the host in which the parasite has become encysted." It is not certain from PERCIVAL's account that the sorus in *Chrysophlyctis* is developed within the parent membrane, as in *Synchytrium*. He has advanced no evidence to show that the formation of two or more sporangia is not merely the result of the segmentation of the vegetative body—each segment forming a separate free sporangium. No striking similarity with the sporangium-sorus of *Synchytrium* has been conclusively demonstrated. Again, the number of sporangia produced is small (one to five), and it is not clear whether the formation of a single sporangium is the usual or an exceptional occurrence.

With regard to the contents of the sporangia, PERCIVAL states that the thick-walled sporocysts contain each several hundred zoospores, and usually large numbers of oil globules of various sizes. The zoospores found within such sporangia are often not of the same size, but when found free-swimming in the water are oval or pear-shaped

* I.e. p. 440.



FIG. 96.--POTATO CANKER (Warty condition).



FIG. 97.--POTATO TENOUR.

(To face p. 368.)



FIG. 98.-- POTATO TUMOUR.



FIG. 99.

A. Potato canker (wart stage).
 B. Potato tumour.
 C. Potato canker.

D. Potato tumour.
 E. Potato canker.
 F. Potato tumour.

bodies, each with a single cilium. The thin-walled sporangia contain few or no free, separate oil drops, and in this respect differ from the thick-walled cysts. The swarmers are smaller in size than those in the sporocysts and usually have a large oil drop within them. He gives a figure (t. 1, f. 7) of the contents squeezed from a fresh sporocyst wherein zoospores and "oil and fat globules" are represented. In studying this figure there are appearances which seem to me to convey a false impression of the nature of the globules. The form is always rounded, not angular, and not like three angular fragments (?) shown.

The globular bodies which I have observed in large numbers in thin-walled sporangia of *Chrysophlyctis* are identical in appearance with those already described* as occurring under certain circumstances in the cells of potato (not affected with *Chrysophlyctis*) and bracken. Nothing definite is yet known with regard to their chemical composition and function. The point that needs to be made perfectly plain is that these bodies appear in preparations fixed with Flemming, and readily take certain stains (using Heidenhain or the Triple stain). The reproduction of the microphotographs (figs. 105, 106) represents a potato cell, after fixation in Flemming's weak solution, containing a number of these minute globular bodies. It should be possible, therefore, to trace their development during a cytological study. This, however, has not yet been done, so that the cytological investigation of *Chrysophlyctis* is not yet complete. GRIGGS† has observed in a series of fixed and stained sections of *Synchytrium* a phenomenon which he describes as "nuclear gemination." The bodies ("nuclei") he figures parallel to a remarkable extent the above-mentioned globular bodies.

PERCIVAL's statement that the structure and division of the primary nucleus and the formation of secondary nuclei are in close agreement with the researches of several investigators upon various species of *Synchytrium* does not aid in establishing actual identity with this genus. Cytological characters of this kind might obtain throughout a group of allied genera.

From the above-mentioned considerations, the transference of *Chrysophlyctis* to the genus *Synchytrium*, in the present state of our knowledge, cannot be maintained.

In *Kryptogamenflora der Mark Brandenburg*, *Chrysophlyctis* is placed among the Olpidiaceae near *Sphaerita*, *Asterocystis* and *Olpidium*. This systematic placing is perhaps premature. From what is at present known regarding these genera, *Chrysophlyctis* seems to possess fewer characters in common with *Olpidium* than with the Synchytriaceae and Woroninaceae, the remaining families of the Myxochytridineae. The matter cannot be settled satisfactorily, however, until the life-histories of these obscure organisms have been more searchingly investigated.

* A. S. HORNE, *Centralblatt für Bakt.* ii., Bd. 28 (1910), p. 403.

† GRIGGS, *Botanical Gazette*, xlvii. (1909), pp. 127-138, pl. 3 and 4.

CHRONOLOGICAL SUMMARY.

- 1878.—R. N[EWSTEAD] writes that he remembers having seen the disease at Upwell, Cambs, about 1878. (59).*
- 1896.—Preliminary note by K. SCHILBERSZKY. Material received from Upper Hungary. (74.)
- 1896-1904.—Diseased tubers sent to Holmes Chapel from Cheshire. (22.)
- 1899-1902.—Record of the occurrence of the disease in Cheshire. (37.)
- 1900.—Disease recorded from Birkenhead.
 Tubers received from Burton-on-Trent by J. PERCIVAL. (62.)
 Diseased tubers received by M. C. POTTER from Cheshire. (67.)
 Tubers received from the Woore district at the Harper Adams Agricultural College. (45.)
- 1901.—Material received by G. MASSEE from neighbourhood of Liverpool. (50.)
- 1902.—July 22.—Diseased tubers sent by Mr. ECKFORD exhibited before Scientific Committee, R.H.S. (16.)
- Aug. 2.—Notice in *Gardeners' Chronicle*. (17.)
- „ 5.—Report by M. C. COOKE before Scientific Committee, R.H.S. Disease named "Tumour in Potato." Organism considered to be *Chrysophlyctis endobiotica*, and likened to *Oedomyces leproides* (Trabut). (16.)
- „ 16.—Abstract of COOKE's report on potato tumour published in *Gardeners' Chronicle*, the earliest published record of the disease in Britain. (17.)
- Nov. 4.—COOKE states that P. MAGNUS had identified the organism with *Oedomyces leproides*. (16.)
- „ 30.—Potatos sent to W. CARRUTHERS by J. C. BRYNER JONES from a garden near Dolgelly. (14.)
 Organism reported upon with figure as a member of the Chytridiaceae, doubtful whether *Chrysophlyctis endobiotica*, Schilb., by Miss LOHRRAIN SMITH to W. CARRUTHERS, for his report ending November 30, 1902. Disease called "canker." (14.)
- Dec. 15.—Organism described by POTTER as *Chrysophlyctis endobiotica*, Schilb. (67.) Organism described by MASSEE as *Oedomyces leproides*, Trabut. Disease called "black scab."—Definite *Urophlyctis*-like spores figured by MASSEE. (50.)
- 1902-1903.—Tubers received by NEWSTEAD from many farms in Cheshire. (58.)
 Material received by R. S. MACDOUGALL from farms in Cheshire. (37.)
- 1903.—March 21.—Short description in *Gardeners' Chronicle* by COOKE; the account noticed by MAGNUS. (19.)

* Numbers in parentheses refer to Bibliography at end.

- May 23.—Letter received from MAGNUS published in *Gardeners' Chronicle*. MAGNUS states that he has never seen the warty disease of potato, and consequently cannot have identified the organism as *Urophlyctis leproides* (Trabut), P. Magnus. (39.)
- Oct. 13.—Crops in allotment gardens in Nottinghamshire destroyed. (20.)
- Nov. 30.—Diseased tubers received by CARRUTHERS from Lancashire. (15.)
- Dec. 19.—Descriptive article in *Gardeners' Chronicle* by N[EWSTEAD]. (59.)
- Description of the disease by MACDOUGALL. (37.)
- 1904.—Description of the disease by J. W. EASTHAM (Holmes Chapel). (22.)
- 1907.—MASSEE again describes the fungus as identical with *Oedomyces leproides*. (54.)
- Aug.—Outbreak in Scotland reported by A. W. BORTHWICK. (12.)
- Dec. 7.—Description of the disease and history of the organism by F. S. SALMON. (71.)
- 1908.—June 18.—An Order issued making the disease notifiable under the Destructive Insects and Pests Act of 1907.
- Aug. 8.—First leaflet issued by the Harper Adams Agricultural College. (41.)
- Oct. 1.—“Black Scab in Potatoes” Order (Ireland).
- Dec. 17.—Description of germination of the spores by MASSEE, who refers the parasite to the genus *Synchytrium*. (56.)
- 1909.—July 31.—Description of germination of the spores by PERCIVAL. (62.)
- Oct.—Disease recorded in Newfoundland. H. T. GÜSSOW states that he has been informed by Professor TRABUT that the disease in beetroot in Algiers is due to a totally different organism from that in potato. (24.)
- 1910.—Jan.—Paper by PERCIVAL describing the life history and cytology of the organism—now called *Synchytrium endobioticum*. (63.)
- 1910.—Statement by MASSEE that he had written to SCHILBERSZKY, who had replied informing him that the organism was not his species and was unknown to him. Organism renamed *Synchytrium solani*. (57.)
- Nov.—Bulletin issued by the Harper Adams Agricultural College. Maps published showing distribution of warty disease in Great Britain and in Shropshire and Staffordshire. (45.)
- 1911.—Report of Intelligence Division of Board of Agriculture issued showing distribution of potato tumour in Great Britain, and detailing results of experiments. (6.)
- Feb. 21.—Letter sent to SCHILBERSZKY from the Royal College of Science, London.
- Feb. 27.—Revised regulations relating to importation of plants into

Canada.—Consignments of potatoes affected with potato tumour (*Chrysophlyctis endobiotica*), or with any disease affecting the tuber either externally or internally, to be destroyed.

1911.—Issue of instructions for the inspection of imported potatoes by the South African Union Department of Agriculture.

2. SPONGOSPORA SOLANI.

Spongospora solani. J. BRUNCHORST, in *Bergens Museum, Aarsberetning*, p. 219. (1886.)

Spongospora subterranea (Wallr.). T. JOHNSON, in *Sci. Proc. Roy. Dub. Soc.* xii. (N.S.), No. 16, p. 165. (1909.)

Spongospora scabies (Berk.). G. MASSEE, in *Jour. Bd. Agric. Eng.* xv. No. 8, p. 592. (1908).

[*Tubercinia scabies*, M. J. BERKELEY] in *Jour. Roy. Hort. Soc.* i. p. 9, 1846.

[*Sorosporium scabies* (Berk.). A. FISCHER DE WALDHEIM] in *Aperçu systématique des Ustilaginées*, Paris. (1877.)

[*Erysibe subterranea*, F. W. WALLROTH] in *Linnaea*, xvi. (1842.)

[*Protomyces tuberum solani*, C. E. P. VON MARTIUS] in *Die Kartoffel-Epidemie*, München. (1842.)

The parasite causing potato canker was first definitely described as a Myxomycete by BRUNCHORST* in 1886. BRUNCHORST discovered a plasmodium resembling that described by NAWASCHIN for *Plasmodiophora*, which existed within the living potato cells. This plasmodium became ultimately converted into a spongy mass of coherent, walled spores—spore-ball. BRUNCHORST thereupon named the organism *Spongospora solani*. In 1906, T. JOHNSON† pointed out that the organism responsible for the disease, which he called “corky scab” in the first instance, was identical with BRUNCHORST’s *Spongospora solani*.

MASSEE referred the same organism‡ to the Ustilagineae, believing it to be identical with the fungus *Tubercinia scabies*§ described by BERKELEY in 1846, and afterwards transferred to the genus *Sorosporium* by FISCHER DE WALDHEIM.

JOHNSON|| stated in his paper, published in the *Economic Proceedings of the Royal Dublin Society* of April 1908, that he had been able to compare type herbarium material of *Sorosporium scabies* (Berk.),

* J. BRUNCHORST, *l.c.*, p. 219.

† T. JOHNSON, *Jahresb. d. Vereinigung d. Vertreter d. angew. Bot.*, iv., (1906).

‡ G. MASSEE, *Jour. Bd. Agr.* xv. (Nov. 1908), p. 593; [Anon. *ibid.* (Oct. 1908), p. 509].

§ Described as *Sorosporium scabies*, Fischer de W., by MASSEE from BERKELEY’s specimens in *Herb. Kew. Text-book of Plant Diseases*, Ed. 1 (1889), p. 405.

|| T. JOHNSON, *Econ. Proc. Roy. Dublin Soc.*, i., part 12 (April 1908), p. 461.

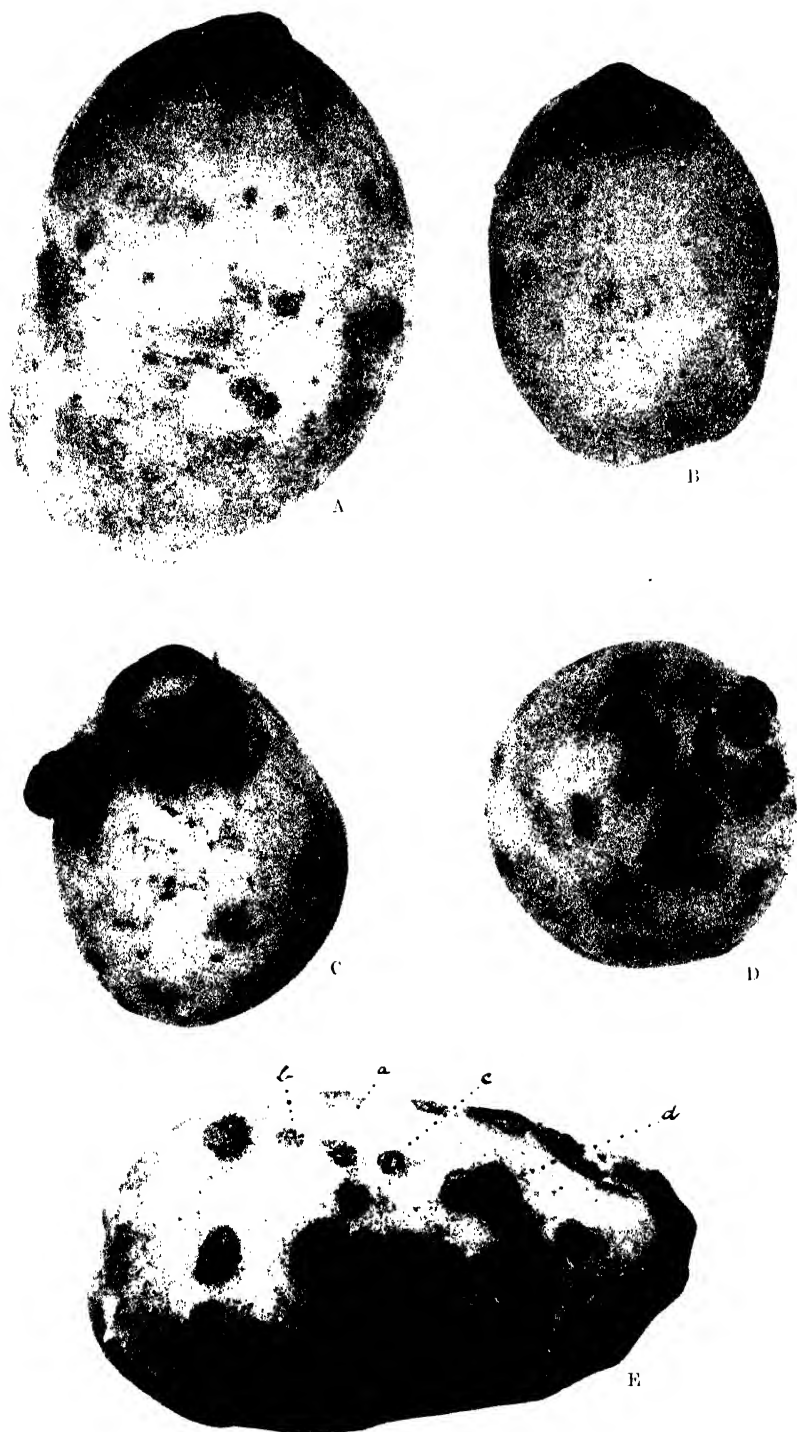


FIG. 100.

A-D. Potato canker (scab stage).

E. Brown scab.

(To face p. 372)

Fischer de Waldheim, received from Kew with *Spongospora solani*, Brunchorst, but could find no difference in size or structure of the spore-balls of the two, and he believed that *Sorosporium scabies* should be removed from the Ustilagineae—that it was really *Spongospora solani*. Soon after the publication of JOHNSON's paper MASSEE* discovered, upon investigating tubers affected with "corky scab," that the organism which he had supposed to be a "smut" fungus was actually a Myxomycete, agreeing with BRUNCHORST's description. He accordingly abandoned the generic but retained the specific name given by BERKELEY, renaming the parasite *Spongospora scabies*.

In the following year a further paper by JOHNSON† appeared in the *Scientific Proceedings of the Royal Dublin Society*. This author, in the course of a retrospective survey of the literature relating to potato scab, now claimed to have traced still earlier supposed records of the occurrence of *Spongospora* than that of BERKELEY, with the result that the discovery of the organism was attributed to WALLROTH, and the parasite was renamed again—this time *Spongospora subterranea* (Wall.), Johnson.

3. SYMPTOMS OF TUMOUR AND CANKER IN POTATO.

Potato canker first manifests itself in the form of small cushions or wart-like excrescences scattered here and there upon the surface of the tubers. These appear singly or in groups or patches. This condition was most strikingly shown by potatoes of the variety 'King Edward VII.' grown in 1910; accordingly one of the plants was selected and, after the removal of the foliage and several tubers, photographed (fig. 96). A full-size illustration of one of the tubers belonging to this plant is shown in fig. 99 A.

In these early stages it is sometimes quite possible to mistake one disease for the other, especially if the "eyes" are affected. The development of several warts close together at the "eye," caused by *Spongospora*, may produce a deformation closely resembling the warty appearance presented by tubers when slightly attacked by *Chrysophlyctis*. The tubers illustrated in figs. 99 C and 99 D are affected with *Spongospora* and *Chrysophlyctis* respectively. It is perfectly clear, however, that it would be impossible to determine the disease correctly, in each case, without the aid of a microscopic examination. The warty condition of the tuber in fig. 99 B is more characteristic of *Chrysophlyctis* than of *Spongospora*. The *Spongospora* warts are usually smooth and show a rounded contour (fig. 99 A); the *Chrysophlyctis* warts are generally rugose, with a broken surface, and possess a very irregular contour (fig. 99 F). The disease in each case is generally easily recognizable if the whole plant be dug up and examined. Difficulties of identification most frequently occur when a few tubers are compared or examined away from the plant.

* G. MASSEE, *l.c.*, p. 592.

† T. JOHNSON, *Sci. Proc. Roy. Dublin Soc.*, xii. (n. s.), No. 14 (1909), p. 165.

The warty condition is not so evident after the tubers have been removed from the soil for a time. The warts become flattened and discoloured, so that raised, more or less chocolate-coloured scars remain in their stead. This is clearly shown in fig. 99 E, which should be compared with fig. 99 A.

The warts frequently develop in a group at the end of the tuber away from the point of attachment to its underground stalk. This particular form of the disease is known in some parts of Britain as "corky end." This grouping is illustrated by a series of figures (fig. 100 A-D) showing all intermediate conditions between an aggregation at the end and a scattered arrangement of the warts.

The tissue forming the wart contains the youngest stage in the life-history of *Spongospora*. The parasite works its way into the tuber from the skin and is able to penetrate and exist within the living cells of its host. *Spongospora* appears within the cells in the form of minute protoplasmic lumps (myxamœbæ), each containing a single nucleus. It is impossible to say at present how the original entry into the tissue is effected. The cells of the potato tissue containing the organism, e.g. those immediately beneath the skin, are now stimulated to divide, and at the same time the minute parasitic bodies (myxamœbæ) also divide, with the result that the parasite becomes distributed in the newly-formed cells. The abnormal local increase in the number of cells brings about tissue swellings which take the form of warts (fig. 99 A) or raised patches (figs. 101 C (b) and 101 D (b)) at the point or area of original infection.

During the further development of the wart, the fungus present in the tissue passes through a peculiar life-history. The separate bodies present in each infected cell become approximated to form, not a true plasmodium, but a colony, and the parasite exists for a time in this form, making use of the nourishment which it is able to obtain in the cells of its host. Very soon, however, the parasite enters upon a new phase of its life-history, and this brings the warty stage of the disease to a close. The colony goes through a series of complex changes, and finally becomes converted into a spongy ball made up of a number of spores, which do not fall apart but remain in close contact with one another. Each of these spores is capable of bringing about the infection of some other potato tuber. During the development of the spore-ball the contents of the host-cell are used up and destroyed, so that the tissue of the wart or warty area dries up and shrivels, leaving a mass of spore-balls in the pit or depression left by the decay of the tissue. This stage is shown in fig. 101 A. Here the crater-like hollows with torn skin at the margin are easily distinguished. The hollows are filled with an exceedingly fine yellowish powder made up of spore-balls and the remains of the tissue in which the spore-balls were formed. The appearances presented by tubers at this stage suggested, in all probability, the name "powdery scab" given to this disease by JOHNSON in 1909.

If the tubers are only slightly attacked by *Spongospora* and the

disease makes no further progress, shallow scabs or scars are left when the spore-ball powder has fallen away. This sometimes gives rise to curious appearances (fig. 101 b). A series of stages may be found from such superficial scabs or scars to cankerous scabs and the more deeply-seated injuries (figs. 100 d and 101 f).

The various scabby appearances are extremely liable to be mistaken for a superficial scab of obscure origin, sometimes called "brown scab," which is very generally distributed in Britain. The tuber in fig. 101 e, photographed immediately upon removal from the soil, represents this scab as it is typically developed in the North of England. The stages of development of brown scab, indicated by the letters a to d, taken in order, differ entirely from those brought about by *Spongospora*, but, although the mode of development of the scab differs in the two cases, it is by no means an easy matter, under certain circumstances, especially when the brown scab is of a more or less "corrosive" character, to distinguish between them. The *Spongospora* scab very frequently possesses a ragged margin formed by the ruptured skin of the tuber (fig. 101 A (a)), and it does not possess the rugose appearance characteristic of brown scab. When the tubers have been rubbed or rolled in the pit or store the distinguishing marks frequently become obliterated. In this condition even a microscopic examination may fail to distinguish the cause.

In 1910 the Transvaal Department of Agriculture issued a Bulletin* dealing with "the recent discovery of the disease known as 'Corky Scab' in English potatoes shipped to South Africa for planting purposes." It is stated that "up to the present 'corky scab' has not been observed in South African potatoes. It is a pest against which growers in this country will have to contend in the near future unless a more uniform and rigid system of inspection of all oversea potatoes is undertaken by the several South African Colonies than is at present in vogue." Since it is a very difficult matter to distinguish between the scabby forms of potato canker which generally result from a slight attack of *Spongospora* and the usually superficial brown scab, even when only a short time has elapsed since the removal of the potatoes from the soil, it would be still more difficult to determine whether the disease were present or absent after a consignment of potatoes had arrived at a Colonial port. It is pointed out below (page 384) that potatoes may or may not be affected with *Spongospora*, or at all events but slightly, even though the soil be thoroughly infected by this parasite. Infection depends upon inter-associated conditions of soil and climate, and upon the particular variety of potato grown. *Spongospora* therefore may be carried upon the surface of tubers, which are not themselves attacked. There can only be a certainty that potatoes do not carry infection when they are selected from districts in which the disease does not exist.

The powdery scab stage is followed by canker. When the spore-

* J. B. POLE EVANS, *Trans. Dept. Agr., Farm. Bull.* 110 (1910).

balls fall away from the potato, hollows of various sizes remain or the surface of the tuber appears to be corroded. Different effects will be produced according to the manner and extent of the encroachments of the parasite. Hence, the tuber in fig. 101 A in a later stage of the disease would show hollow places where the spore-balls now rest; the tuber in fig. 101 D would show a cankerous band and so on.

It is quite clear from a study of the symptoms of potato canker due to *Spongospora solani* that it is of the nature of a canker (canker=an eating, corroding or other noxious agency producing ulceration, gangrene, rot, decay, etc.). The organism (*Chrysophlyctis endobiotica*) causing potato tumour (black scab), on the other hand, does *not* produce injuries of a cankerous nature, but induces the formation of swellings or tumours—hence the name “potato tumour” given to it in the first instance by COOKE.* The terms canker and tumour express not only the trend of the disease, but the essential difference between the characters of the injuries brought about in the tuber in each case.

The names commonly used for these diseases are as follows:—

Disease due to *Spongospora solani*.

†Corky Scab (T. Johnson).

Powdery Scab (T. Johnson).

Spongospora Scab (G. H. Pethybridge).

Potato Canker (G. H. Pethybridge).

Corky End.

Disease due to *Chrysophlyctis endobiotica*.

Potato “Tumour” (M. C. Cooke).

Potato Canker (W. Carruthers’ Report, 1902).

(H. T. Güssow).

Warty Disease (M. C. Potter).

Black Scab (G. Massee).

During the progress of the disease, the tubers may become variously misshapen owing to the formation of tuberous outgrowths (fig. 102 E). Fig. 102 F shows one of these outgrowths which was cut through immediately upon removal from the soil in order that the distribution of the parasite in the tissue might be seen. The tissue of the brownish layer (b) contains the spore-balls of the parasite. Just below the brown layer is one of milk-white appearance (c): the tissue of this layer contains the stages prior to spore-ball formation. Below the second layer a fine dark line can be distinguished with a lens when looking at the cut surface of the tuber, but this is not clearly visible in the photograph. This line indicates the boundary between the diseased and healthy tissues, and beyond it the parasite does not exist. These outgrowths

* M. C. COOKE, *Jour. R.H.S.*, xxvii. (1902), p. cxliv., and *Gard. Chron.* xxxii. (1902), p. 124.

† The name “Corky Scab,” given to this disease by JOHNSON, was subsequently abandoned by him as unsuitable. (*Sci. Proc. Roy. Dublin. Soc.*, xii. (n.s.) (1909), p. 165.)

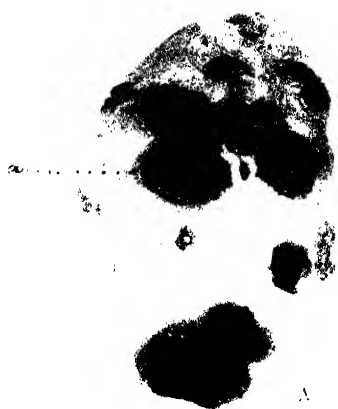


FIG. 101.

A. Potato canker (powdery-scab stage).
B D. Potato canker.

E. Potato tumour.
F. Potato canker.

(To face p. 376)



FIG. 192. A-F. Potato canker.

may be more or less uniformly attacked (figs. 102 E (a) and 102 F) or covered with scabs. In the latter condition they may bear a superficial resemblance to the tumours caused by *Chrysophlyctis*.

The processes described above result in severe cases in very considerable deformation of the tuber and the appearances presented are very variable (fig. 102 A-D).

The late symptoms of potato canker are more prominent than the early ones. On this account tubers in a late stage of attack are more usually sent for examination. They are frequently sent some time after they have been removed from the soil. A determination of the organism under these circumstances is not easy. Sometimes the spore-ball powder has fallen away from the tuber so that a microscopic examination reveals only a few yellowish bodies of doubtful character. If spore-balls are present, they are frequently associated with the hyphae of various fungi—the association is so close in some instances that it is difficult to convince oneself that the spore-balls are not the reproductive bodies of a fungus.

The papers by JOHNSON and MASSEE respectively contain contradictory statements in matters of actual observation relative to the life-history of *Spongospora*. MASSEE* claims to have observed the youngest condition of the parasite in the host-cell—the myxamœbæ. JOHNSON,† on the other hand, not only stated that MASSEE was wrong, having mistaken young starch-grains for myxamœbæ, but compared MASSEE's figure of myxamœbæ with one of his own photographs of starch-grains in the potato-cell. I first saw myxamœbæ in September 1910, and was able to confirm my own observation after a study of microscopic preparations made at the Royal College of Science, London, in October. The observation was recorded in a preliminary note on *Spongospora* published in the *Annals of Botany*.‡ In the same number of the *Annals*, T. G. B. OSBORN§ recorded the same fact. Professor J. W. H. TRAIL has also observed the myxamœbæ. MASSEE's discovery of myxamœbæ therefore has been amply confirmed. Again, JOHNSON|| pointed out that the spore-balls of the parasite were of a spongy texture and not hollow as described and figured by MASSEE.¶ If they were hollow the resemblance would be closer to the hollow reproductive organs of BERKELEY's *Tubercinia scabies*, but JOHNSON's observation has been confirmed recently by OSBORN** and myself††; so that in this particular MASSEE's description is incorrect.

JOHNSON,‡‡ in the *Economic Proceedings of the Royal Dublin*

* G. MASSEE, *Jour. Bd. Agr.*, xv. (1908), p. 592.

† T. JOHNSON, *Sci. Proc. Roy. Dublin Soc.*, xii. (n.s.) (1909), p. 170; pl. xiii., figs. 3, 4.

‡ A. S. HORNE, *Annals of Botany*, xxv. (1911), p. 272.

§ T. G. B. OSBORN, *Annals of Botany*, xxv. (1911), p. 271.

|| T. JOHNSON, *l.c.* p. 170.

¶ G. MASSEE, *l.c.* p. 597.

** T. G. B. OSBORN, *l.c.* p. 271.

†† A. S. HORNE, *l.c.* p. 272.

‡‡ T. JOHNSON, *Econ. Proc. Roy. Dublin Soc.*, i. (1908), p. 459.

Society, gives the following description of the probable behaviour of *Spongospora* in the potato plant:—"Keeping in mind what is known of the mode of life of other slime-fungi, the life-history of *Spongospora* seems to be very much as follows:—

"A scabby potato is planted and sprouts. The stored solid proleids (crystalloids) and carbohydrate bodies (starch grains) in the tuber become diffusible. The resting plasmodium of *Spongospora* in the host-cells becomes at the same time actively motile, and feeds in the now available organic food-materials of the host-cells. As the potato eye sprouts and forms a shoot, the parasitic plasmodium passes into it. The shoot develops and gives off branches and tubers into which the parasitic plasmodium passes, living on the host-cells' contents in its passage. In the growing tuber the plasmodium luxuriates. As the tuber ripens, with loss of water and solidification or precipitation of its stored organic matter, the plasmodium creeps towards the surface of the tuber and becomes converted into spore-balls, usually one in each host-cell. The spore-balls raise the skin of the tuber, which peels off, leaving exposed a wound full of spore-balls."

JOHNSON's description of 1908* refers to the probable behaviour of the parasite in the potato; in 1909,† however, the impression is conveyed that the life-cycle of *Spongospora* had been actually determined. "The plasmodium, too, carries the disease from the seed-tubers through the stoloniferous branches over into the new tubers, making them scabby as I have already shown." This sentence refers apparently to experiments described in 1908‡ and 1909.§—"In 1905, I planted a scabby tuber and found the crop scabby, indicating that the disease passes from the seed-tuber to the new crop of tubers as a plasmodium, through the haulm and branches of the rhizome. I have seen the scab on a rhizomatous branch itself" (1908); and, "I planted healthy tubers of 'Sutton's Superlative,' into which I had previously grafted a wedge of a scabby tuber, from which all the spore-balls, so far as I could make out, had been scraped off. The tubers formed were scabby. Thus it appears that the resting plasmodium can communicate infection to healthy tubers" (1909). These experiments, however, absolutely fail to demonstrate the peculiar behaviour of the parasite ascribed to it by this author. MASSEE|| states: "It is highly probable that the plasmodium in the scabbed potatoes become encysted during the winter months, and resume their activity when the potatoes commence to sprout." He has, however, brought forward no convincing evidence in support of this view. It has been already pointed out that the distribution of *Spongospora* in the tuber can be easily seen on cutting the tuber open. The line of demarcation between the

* T. JOHNSON, *l.c.* p. 459.

† T. JOHNSON, *Sci. Proc. Roy. Dublin Soc.*, xii. (n.s.) (1909), p. 171.

‡ T. JOHNSON, *Econ. Proc. Roy. Dublin Soc.*, i. (1908), p. 458.

§ T. JOHNSON, *Sci. Proc. Dub. Soc.*, xii. (n.s.) (1909), p. 173.

|| G. MASSEE, *Jour. Bd. Agr.*, xv. (1908), p. 592.—This paper is without the author's name, but it is quoted in *Diseases of Cultivated Plants and Trees*, p. 532.

areas of tissue occupied by the parasite and the unaffected areas is usually very distinct, even in microscopic preparations. The parasite does not during any stage or phase of its life-cycle occur generally distributed throughout the tuber, neither has any evidence been advanced to show that it passes from one part of the plant to another by means of the conducting tissue of the vascular bundles. My own observations seem to indicate that the parasite passes through the several stages of its life-cycle wherever it be found, forming eventually reproductive bodies (spore-balls). During the period of sporulation, the host-cells containing the parasite rapidly decay. Before accepting the view adopted by JOHNSON and suggested by MASSEE, convincing evidence is needed—(1) that the plasmodium of the parasite passes into a resting condition and in this form is able to and actually does hibernate during the winter, (2) that the parasite is able to and does migrate from the diseased set into the young tubers produced by the plants grown from this set by way of the rhizome.

4 THE SUPPOSED EARLIER RECORDS OF THE OCCURRENCE OF SPONGOSPORA.

Certain authors claim to trace the discovery of *Spongospora* to an earlier date than 1886. MASSEE credits BERKELEY with the discovery in 1846. JOHNSON, on the other hand, believes that WALLROTH* was the first to describe the organism in 1842. There is still a third, C. E. P. VON MARTIUS,† who was for some time engaged in investigating an epidemic of potato disease in Germany about the time when WALLROTH's technical description of *Erysibe subterranea* appeared in *Linnaea*.

In BERKELEY's paper‡ on the potato murrain, published in 1846, mention is made of a disease known commonly by the name of the scab. This is frequent, especially in calcareous districts. "The surface of the potato being covered with pustules, which at length become cup-shaped, and are powdered within with an olive-yellow meal, consisting of the spores of a fungus." This description is certainly suggestive of potato canker. But whether BERKELEY was or was not acquainted with potato canker, does not affect the question of the description of the organism concerned. This must be judged upon its own merits. BERKELEY describes the organism as follows:—"Amongst the diseases noted by MARTIUS, is one which he considers as depending on a species of *Protomyces*. As I have seen this in various stages of growth and attached to its flocci, I have thought it worth figuring. It appears to me to belong to the genus *Tuburcinia*, Fr. The spores have usually one or more cavities on the surface communicating with the interior cavity. They may perhaps therefore be considered rather as compound bodies consisting of a quantity

* F. W. WALLROTH, *Linnaea*, xvi., Heft 3 (1842).

† C. E. P. VON MARTIUS, *Die Kartoffel-Epidemie*, 1842.

‡ M. J. BERKELEY, *Jour. R.H.S.*, i. (1846), p. 9.

of cells arranged in the form of a hollow ball." The recorded observation in this description that the "spores" have usually one or more cavities on the surface communicating with the interior, is perhaps highly suggestive of *Spongospora*, but Berkeley's statement that he saw the organism *in various stages of growth and attached to its flocci* is an important point of disagreement. Unfortunately the figures are by no means definite, the drawings do not at all resemble the actual spore-ball of *Spongospora*.

As noted earlier in this paper (p. 377), in late stages of the disease, and even in the powdery scab stage, the spore-balls or whatever spore-balls remain *in situ* among the disorganized cells of the host are frequently intimately associated with the hyphæ of various fungi. The spore-balls appear sometimes to be attached to hyphæ, or hyphæ twine round them and often link them together.

Under such circumstances it is not surprising that the "organism" described by Berkeley should have been referred to the Ustilagineae. But there are other considerations which introduce a certain element of doubt as to whether BERKELEY's figures really relate to the spore-ball of *Spongospora*. During the winter 1909-1910, a number of Hyphomycetous fungi appeared and flourished upon the surface of some tubers which had been kept in a damp atmosphere in the Laboratory. Amongst these were forms of *Verticillium*, *Stysanus*, *Alternaria*, *Spondylocadium*, and many others. After a time, a number of structures of a golden-brown colour appeared among the hyphæ. For a long time it was not easy to be sure that these actually belonged to conidial Hyphomycetous forms. But at length all stages in their development were observed in the case of *Verticillium*, and similar structures were definitely determined to be attached to the hyphæ of *Stysanus*. The fact that fungi producing structures closely resembling the spore-balls formed by certain genera of Ustilagineae occur on the potato, renders it a difficult matter to establish the identity of the "organism" described and figured by BERKELEY with *Spongospora solani*.

The method of development of these structures is briefly as follows: Short, septate, lateral hyphæ grow out from the main filament. The end cell or cells of the branch enlarge and become capable of staining more deeply than the remaining cells of the branch. These end-cells then bend over, so that the branch has a crozier-like appearance. The encircling non-staining cells form branch cells during the process of coiling, so that the end-cells become enclosed in a jacket of hyphal cells. Figs. 104 A-E illustrate the method of formation of these bodies in the case of *Verticillium*. In fig. 104 A only one cell is sharply marked off from the others, this cell has already bent over; figs. 104 B-D show stages in the coiling process; figs. 104 E, F show the complete ball: in fig. 104 E only one special cell; in fig. 104 F more than one are enclosed. Figs. 104 G-I show similar bodies belonging to *Stysanus*. The number of special cells enclosed in the ball seems to be greater in the case of this Hyphomycete. Fig. 104 J relates to similar

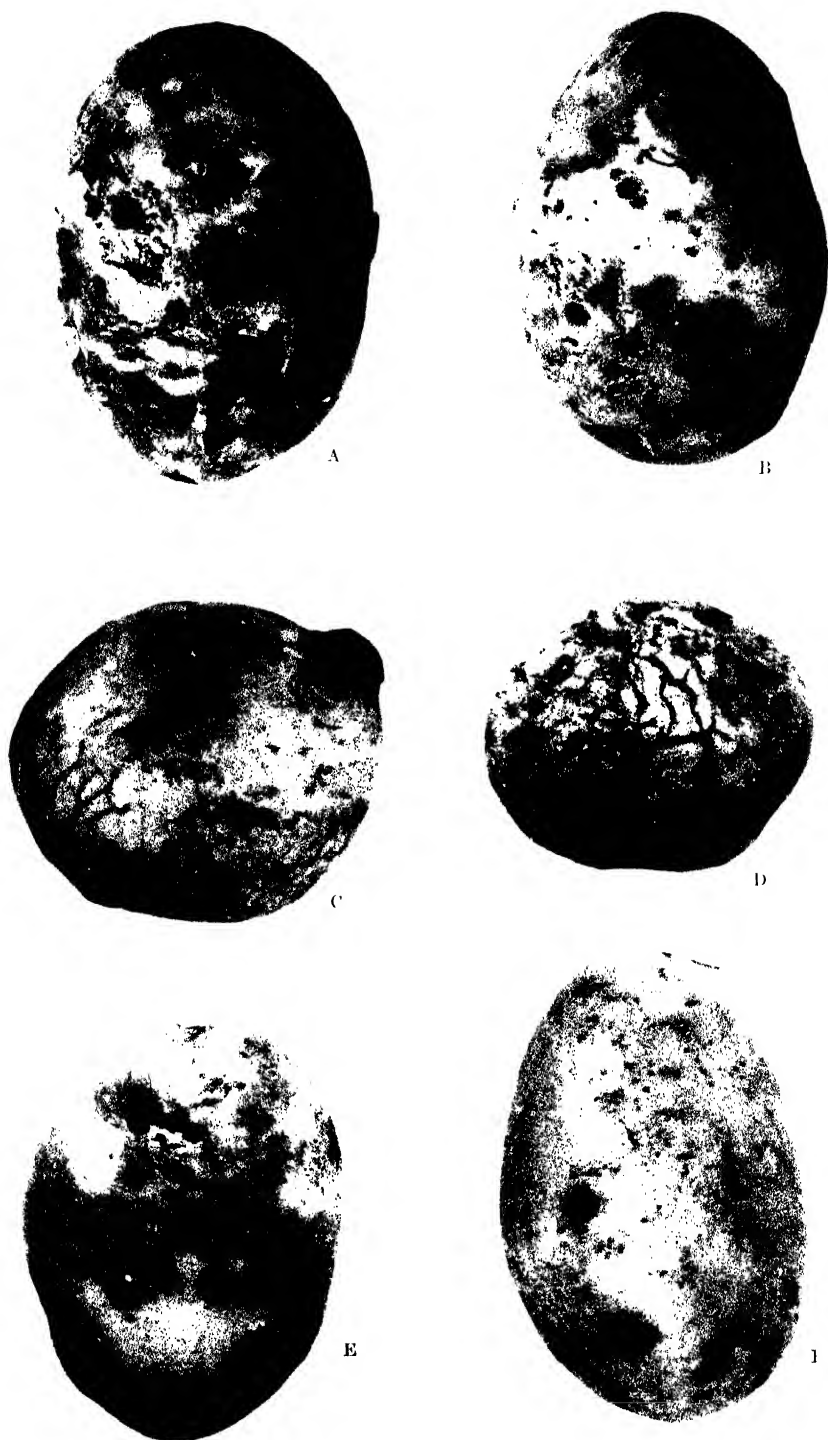


FIG. 103.

A, B. Brown rot (Cleason, 1909).
C. Potato canker (Cleason, 1910).

D, E. Brown rot (Cleason, 1909).
F. Potato canker (Cleason, 1910).

bodies found associated with another Hyphomycetous fungus. In another case, balls of blackish spore-like bodies were formed in a somewhat similar manner, except that differentiation into two kinds of cell was not observed. Figs. 104 k-o illustrate the stages in development.

In JOHNSON'S * paper, entitled "Further Observations on Powdery Potato Scab," a comparison is made between a figure reproduced from MARTIUS' work, *Die Kartoffel-Epidemie*, and one of BRUNCHORST'S figures. These figures relate to sections of potato containing *Protomyces* (Martius) and *Spongospora* (Brunchorst), respectively. This comparison, however, explains nothing at all. Appearances resembling those represented in MARTIUS' figure (Plate xii., fig. 2, Johnson) are often seen in diseased potato tissues which are not affected with *Spongospora*. BRUNCHORST'S figure (Plate xii., fig. 3, Johnson), however, undoubtedly conveys the idea that abnormal cell formation is taking place locally.

If reference be made to *Die Kartoffel-Epidemie*,† and especially to the illustrations, it will be seen that the latter relate to several organisms. Figs. 34 and 35 of MARTIUS represent starch grains, which are corroded as if by the action of *Phellomyces*; fig. 5 represents a tuber affected with "dry rot" (*Fusarium solani*). Figs. 3, 4, and 5 are suggestive of *Fusarium*. Figs. 9, 10, 19, and 25 (*Protomyces*) are unconvincing. The bodies figured are angular and irregular in contour, whereas the spore-balls of *Spongospora* are rounded and generally possess a regular outline. Since the starch grains (figs. 34 and 35) are fairly accurately represented, it is not so easy to believe that the drawings of *Protomyces* were really made from *Spongospora* spore-balls. Figs. 36 and 37 (*Protomyces*) might represent *Spongospora*.

JOHNSON ‡ states that the first account of the scab fungus is given by WALLROTH in *Linnæa*, 1842; that MARTIUS saw WALLROTH'S preparations and description, and agreed with him as to the nature of the organism; that MARTIUS transferred the fungus to the genus *Protomyces*, and gave an amended diagnosis of it—this was in *Die Kartoffel-Epidemie*.

WALLROTH'S§ description, which is very short, and without illustrations, was written February 15, 1842. It was published in Part 3 of *Linnæa* for that year. Since this part contains papers written in June, the actual date of publication must have been later. The disease was mentioned by MARTIUS || in a paper overlooked by JOHNSON, read before l'Académie des Sciences on August 16, 1842, published in *Comptes Rendus*, No. 7 (1842), and abstracted in *Annales Science Naturelle*. In these publications the organism is referred to as a *Protomyces*. It is probable that a very short interval elapsed between the date of publication of WALLROTH'S technical description in *Linnæa* and MARTIUS' paper. It would thus be difficult to determine which

* T. JOHNSON, *l.c.* p. 169.

† C. E. P. VON MARTIUS, *l.c.*

‡ T. JOHNSON, *l.c.* p. 168.

§ F. W. WALLROTH, *l.c.*

|| C. E. P. VON MARTIUS, *Comptes Rendus*, xv., No. 7 (1842), p. 314.

author held priority, and on this ground alone JOHNSON was scarcely justified in changing the name of the parasite from *Spongospora solani*, Brunch., to *Spongospora subterranea*, Wallr.

An earlier record of WALLROTH'S *Erysibe subterranea* occurs in *Versam. Deut. Nat. und Aerzte Braunschweig*, 1838-1841.* On September 22, 1841, some diseased potatoes affected with *Erysibe* were sent with a letter by WALLROTH in Nordhausen to Professor BARTLING. From this it is clear that the organism described by WALLROTH in *Linnæa* was already known by the name of *Erysibe* in 1841.

The critical remarks which have been made relative to BERKELEY'S *Tubercinia* apply with almost equal force to WALLROTH'S *Erysibe* and MARTIUS' *Protomyces*. There is no doubt that the three observers were acquainted with the disease itself (potato canker), and that the reproductive bodies of *Spongospora* had been observed. But the descriptions of the "organism" in each case are imperfect and incomplete. On this account, therefore, it seems more desirable to retain the name *Spongospora solani* given to the parasite by BRUNCHORST than to adopt first this and that name, as each probing of the older literature of the subject brings to light some new fact.

5. FIELD OBSERVATIONS.

Amongst the cases of canker reported in the *Journal of the Board of Agriculture* in November 1909, only one is mentioned as occurring amongst a field-crop of potatoes. Several cases of the disease which I saw during a visit to Scotland in September 1910, however, occurred in the field: particularly in the Dunbar district, at Prestonpans in the Edinburgh district, and in Aberdeenshire. One of the worst cases affecting a field-crop in the county of Durham is worthy of special notice, in that experimental work was in progress on the farm in connexion with potato disease. In 1909 the crop suffered severely from an attack of *Phytophthora infestans*, and it was decided to lay out a number of experimental rows, using different varieties of potatoes in order to test their disease-resisting power under the circumstances of soil and climate which obtained on this particular farm. The potatoes were derived from several different sources, and only carefully selected tubers were planted. The varieties and their origin are shown in the following table:—

TABLE I.

Variety.	Source of Seed, etc.
1. Dalhousie	Scotch seed, 1910, used for the main crop.
2. Midlothian Early	{ Selected from seed raised in the Armstrong College garden—newly made soil—in 1909.
3. British Queen	
4. Snowdrop	Purchased locally.
5. Duke of Albany	" "
6. King Edward VII. . . .	" "
7. Duke of York	" "
8. Collingwood	" "
9. Sir John Llewelyn	" from another source.

* BARTLING, "Ueber Wallroth's eingesamte kranke Kartoffeln" (Sept. 22, 1841), *l.c.*

TABLE I.—(continued).

Variety.	Source of Seed, etc.
10. Langworthy	Purchased from another source.
11. Sutton's Abundance	"
12. British Queen	Bishop Auckland, 1908; " seed from these grown partly in Devon and partly in Newcastle, 1909 seed from these planted at Cleadon, 1910.
13. Up-to-Date }	Dunbar, 1908; Cleadon, 1909; selected tubers kept through the winter at Newcastle and planted 1910.
14. Dalhousie }	
15. Up-to-Date and Dalhousie	Dunbar, 1908; Cleadon, 1909; selected tubers left in the soil of the farm and others in the manure used on the farm through the winter, and planted 1910.

In 1910 the loss occasioned through *Phytophthora* was slight, but a "new" disease—potato canker—manifested itself. This disease was first detected towards the middle of September, when some plants of the variety 'King Edward VII.' were lifted and found to exhibit incipient stages of canker. Thinking that the disease might be confined to this variety, it was decided to dig up all the tubers and remove them from the soil at once. Soon afterwards, however, it was discovered that not only were the remaining experimental rows attacked, but that the main crop was slightly affected, so that it was not possible to eradicate the disease. The potatoes were lifted by the middle of October, and by this time the reproductive bodies of the parasite had been formed, which, falling from the diseased tubers, remained to infect the soil.

It is perfectly clear that the parasite was not introduced on the land—which was uniformly infected—in 1910 by means of infected seed, since the seed came from several different sources (as shown by the table) and was carefully examined; moreover, tubers from every sample grown at Cleadon were planted in the Armstrong College garden, and others, from a few samples, were sent to Devonshire, but not a single case of canker occurred in those places.

I am indebted to Dr. W. G. SMITH, of the East of Scotland College of Agriculture, for permission to visit the experimental plots at Prestonpans, where trials were being made of potatoes of a given variety grown in different districts in the previous year. All the rows were equally affected, but very slightly, with *Spongospora*. The varieties of potato and the localities from which the seed was obtained are given in the following table of the additional cases of the occurrence of canker:—

TABLE II.

Variety.	Remarks.
1. Navarre	Grown at Dunbar; farmyard and artificial manure used. Rotation: potatoes, wheat, hay, potatoes, turnips, barley, potatoes.
2. Langworthy—	Grown at Prestonpans; all slightly affected; artificial manure used. Rotation: barley, hay, oats, potatoes.
(1) Seed from Boon.	
(2) Seed from Midlothian.	
Up-to-Date—	
(1) Seed from East Lothian.	
(2) Seed from Leadburn.	
(3) Seed from Boon.	
(4) Seed from Banffshire (coast).	

TABLE II.—(continued).

Variety.	Remarks.
3. Aberlady Early	Grown near Edinburgh; slightly affected; artificial manure and dung used.
Up-to-Date.	
4. Langworthy	Grown at Auchnagatt, Aberdeenshire; slightly diseased; soil loamy; six to ten years' rotation or longer.

The case at Prestonpans appears to be similar to that already described at Cleadon. It seems improbable that the disease was introduced by the seed obtained from so many different localities.

Amongst the varieties grown at Cleadon, 'King Edward VII.' and 'Midlothian Early' were more badly diseased than the others. An attempt was made, therefore, to find out whether the former variety was affected to the same extent in other districts. The result of these observations is shown in the following table:—

TABLE III.

CANKER IN THE VARIETY 'KING EDWARD VII.,' SEPTEMBER 1910.

District	Observations	Manure
1. Farm at Hawthornden, near Edinburgh	Not affected, but disease present in other varieties	From gum works.
2. Farm at Hawthornden	Slightly affected	From gum works.
3. Experimental station, Edinburgh district.	Not affected, but disease present in other varieties	Sulphate of ammonia and dung.
4. Prestonpans	Slightly affected	Partly artificial.
5. Garden at Armstrong College	Not affected	A little artificial.
6. Cleadon—same seed used as in 5	Badly affected	Peat-moss litter and farmyard manure.
7. Cleadon—another field	Badly affected	Similar to 6.
8. Allotment garden, Gosforth, Newcastle-upon-Tyne	Badly affected	
9. Auchnagatt, Aberdeenshire	Not affected	A local potato manure and dung.

From this table it is clear that a variety which in one district is badly diseased, may be only slightly affected in another; and sometimes does not take the disease at all, or only slightly, when other varieties on the same farm are affected.

The first crop at Cleadon in 1909 was grown in a field bordering those used in 1910, and in this year the potatoes were badly affected with *Phytophthora*; but although the farm was visited repeatedly during the season and a large number of tubers was examined, not a single case of canker was observed. If the disease had affected the crop to any extent it could hardly have been overlooked. Fortunately several of the diseased tubers—typical examples grown in 1909—were photographed. The potatoes in the photographs (figs. 103 A, B, D, E) show only a few scabby spots, possibly caused by *Spongospora*. These should be compared with fig. 103 F, which represents a tuber grown in 1910 showing similar scabby spots, known to be caused by *Spongespora*. It seems, therefore, that potato canker was either not present in the soil of the field used in 1909 or, more probably, was present, but had not manifested itself to a recognizable extent. Cases of a

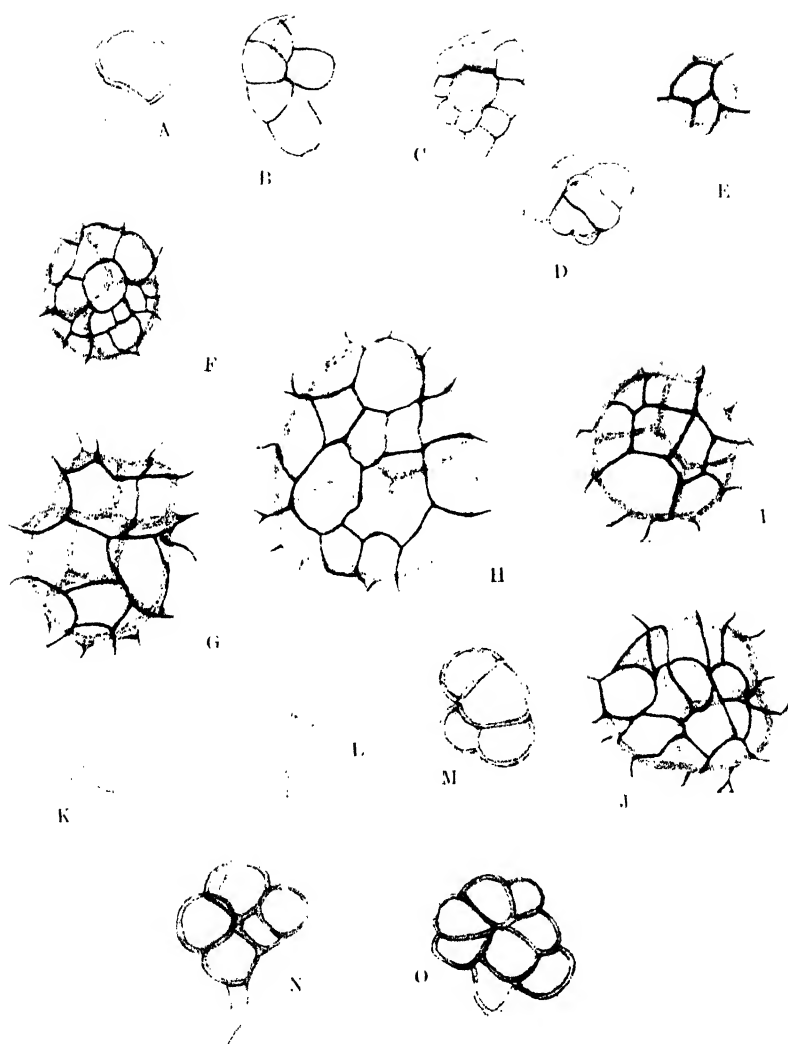


FIG. 104. STAGES IN DEVELOPMENT OF CELL-BALLS OF FUNGI ON POTATO-TUBERS.
 A-F. *Verticillium*.
 G-I. *Stysanus*.
 J. Another *Hyphomycete*.
 K-O. Another *Hyphomycete*.

(To face p. 381)



FIG. 105. GLOBULAR BODIES IN CELL OF POTATO FIXED IN FLEMING'S SOLUTION. (STAINED WITH OSMIC ACID.)



FIG. 106. GLOBULAR BODIES IN CELLS OF POTATO. (STAINED WITH TRIPLE STAIN.) ($\times 2200$.)

peculiar distribution of *Spongospora* have been reported from gardens, but the information available is too indefinite to be of service. It is by no means an unusual experience in potato fields where a regular rotation takes place to find that a particular disease—known to occur upon the fields used for potato-growing—which was prevalent in one year does not appear, or not to any extent, on the same farm in the following year. This happened in connexion with *Phytophthora* at Cleadon, but the seasonal conditions in this district in 1909 differed from those obtaining in 1910. It is a common experience with "Sprain." Thus a number of factors would have to be considered before it could be stated that *Spongospora* does not exist upon a particular field or farm. The above-mentioned observations emphasize the importance of exercising a considerable amount of caution in the interpretation of the results of field experiments carried out over a limited period of time within a limited area.

The use of lime has been advocated as a remedy for the disease, and in MASSEE'S *Diseases of Cultivated Plants and Trees* the following advice is given: "Infected land should be dressed with quicklime, preferably in the spring, when the spore-balls are germinating in the soil." The experimental rows at Cleadon extended twenty-eight yards down the field, and these received a light dressing of lime fourteen yards down, so that half the quantity of each variety was planted in limed, the other half in unlimed, soil. In some cases lining the soil appeared to have a beneficial effect upon the *foliage*, but in almost every instance it brought about an increase in the amount of disease. A similar result was obtained by G. H. PETHYBRIDGE in experiments conducted at Clifden, and near Belmullet, in Ireland.

[I wish to express my thanks to Professor J. B. FARMER, F.R.S., and to Mr. F. J. CHITTENDEN, F.L.S., for valuable advice and criticisms in connexion with this paper. I also desire to acknowledge my indebtedness to the Royal Society for help from a Government Grant in aid of the investigation of the more obscure diseases of the potato.]

SUMMARY OF OBSERVATIONS.

1. The field crop and a number of experimental rows of potatoes grown at Cleadon in 1910 were affected with potato canker. It is extremely improbable that the disease in this case was introduced by infected seed in 1910, for the following reasons:—

(a) The seed had been derived from several different known sources.

(b) The potatoes planted in the experimental rows had been carefully selected.

(c) The land was found to be uniformly infected.

2. A particular variety, the 'King Edward VII.,' was badly diseased in some districts but only slightly affected, or not at all, in others, although other varieties in the same fields were diseased.

3. *Spongospora* may be present in the soil of a particular field or farm, but the disease may not manifest itself to any extent.

4. The addition of lime to the soil at Cleadon brought about an increase in the amount of disease.

DESCRIPTION OF FIGURES.

FIGURE 96.—Portion of plant affected with potato canker in its early stages.

FIGURE 97.—Plant affected with potato tumour due to *Chrysophlyctis*.

FIGURE 98.—Plant badly affected with potato tumour.

FIGURE 99.—A. Potato showing numerous small warts—the warty stage of potato canker.

- B. Potato attacked with *Chrysophlyctis*, showing outgrowths at the "eye." When the *Spongospora* warts seen at A are crowded together at the "eye," an appearance resembling B, a, may be sometimes observed.
- C. Potato affected with *Spongospora solani*. Particular attention should be given to the "eye" marked b.
- D. Potato affected with *Chrysophlyctis*. The excrescences at c and d should be compared with that marked b in c.
- E. Potato affected with *Spongospora* photographed some hours after removal from the soil. The difference in colour of the diseased spots in A and E records an actual difference in colour when photographed.
- F. Potato affected with *Chrysophlyctis*.

FIGURE 100.—A-D. Potato canker—various scabby appearances.

- E. Potato affected with brown scab—not caused by *Spongospora*.

FIGURE 101.—A. Potato affected with *Spongospora*—powdery-scab stage.

- B. Potato showing curious button-like scars, sometimes left by *Spongospora*.
- C, D. Potatoes showing a broad, somewhat wrinkled band (b) affected with *Spongospora*.
- E. Potato affected with *Chrysophlyctis* for comparison with c.
- F. Potato showing hollow space (c) left after the spore-balls of *Spongospora* have fallen away. Compare with A, a.

FIGURE 102.—A-D. Misshapen potatoes affected with *Spongospora*.

- E. Tuberosus outgrowth (a) from the surface of a potato affected with *Spongospora*.
- F. An outgrowth similar to that shown in E, cut open; b, limit of brown zone containing the mature spore-balls of the organism; c, limit of the milky-white zone containing the myxamœbæ and "plasmodia"; d, boundary of the cut area.

FIGURE 103.—A. Potato affected with *Phytophthora*—Cleadon, 1909.

- B. Potato affected with *Phytophthora*, showing small scabby spots—Cleadon, 1909.
- C. Potato affected with *Spongospora*, showing cracks characteristic of the epidemic of *Phytophthora* in the previous year—Cleadon, 1910.
- D. Potato affected with *Phytophthora*, showing cracks—Cleadon, 1909.
- E. Potato affected with *Phytophthora*, showing scabby spots suggestive of *Spongospora*—Cleadon, 1909.
- F. Potato affected with *Spongospora*—Cleadon, 1910.

FIGURE 104.—A-E. Stages in the formation of the cell-ball of *Verticillium* ($\times 750$).

- A. Lateral branch with special end-cell.
- B. Showing the bending over of the end-cell.
- C. Showing branch-cell developed from one of the investing hyphal cells.
- D. Special-cell almost enclosed.
- E. Cell-ball complete (diam.=19m.), one special cell enclosed.
- F. Cell-ball (diam. 28m.) with more than one special-cell enclosed.
- G. Cell-ball of *Stysanus*.
- H. Cell-ball of *Stysanus* (dimensions 34.5m. \times 45m.).
- I. Cell-ball of *Stysanus*.
- J. Cell-ball found associated with another Hyphomycete (diam.=42m.) ($\times 750$).
- K-O. Stages in the development of a cell-ball not invested with hyphal cells ($\times 750$).
- K, L. Formation of special cells at the end of a short lateral branch.
- M. Showing the arching-over of the end-cells.
- N. A later stage.
- O. Cell-ball complete (length=31m.)

FIGURE 105.—Globular bodies in cell of potato fixed in Flemming's solution (stained with osmic acid).

FIGURE 106.—Globular bodies in cells of potato. Stained with Triple stain ($\times 2200$).

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WISLEY SCHOOL OF HORTICULTURE.

TEN students completed the two years' course of instruction at the Wisley School of Horticulture during the year 1911. Five sat for the Diploma Examination at the end of March and five at the end of July. As in past years, the examination included written and practical papers in the Principles and Operations of Horticulture, Mr. John Fraser, F.L.S., acting as external co-examiner with the Director and Superintendent. Each candidate was required, in addition, to present an essay on an approved horticultural subject, and collections of at least 200 properly dried and localized British plants and of useful and injurious insects. Marks were also credited for original observations made during the year. Mr. James Hudson, V.M.H., kindly adjudicated upon the essays presented, those of Mr. Norman Johnson on "Birds of the Garden" and of Mr. A. E. Haarer on "Tomato Cultivation" being placed first. Seven candidates satisfied the examiners, their names in order of merit being—

1. Mr. H. E. Beale.
2. { Mr. Fritz Bowyer.
- { Mr. A. E. Haarer.
4. Mr. D. J. Powell.
5. Mr. Norman Johnson.
6. Mr. H. L. McCourt.
7. Mr. P. S. Patrick.

Eighteen students entered for the Society's General Examination, and all were successful (p. 211), and one for the Teachers' Examination, who was also successful (p. 219).

The following prizes (books) were awarded on the results of the Diploma Examination:—

Prizes provided by the income of the "Sutton Prize Fund" of the value of £1 10s., £1, and £1 to Mr. H. E. Beale, Mr. Fritz Bowyer, and Mr. A. E. Haarer respectively.

"Nicholson Prize," of the value of £2 2s. (provided by the income of the "Nicholson Memorial Fund"), for observations on the flora and fauna of Wisley and its neighbourhood, to Mr. Gordon W. Gibson.

In February 1911, Mr. J. W. McCaig, a third-year student, left to take up a scholarship, tenable for three years, at the Imperial College of Science, granted by an anonymous donor.

 COMMONPLACE NOTES.

By the SECRETARY, SUPERINTENDENT, and EDITOR.

ESTATE DUTY.

WE have received the following note from the Secretary of the Royal English Arboricultural Society, and have no doubt many Fellows will value the important information it contains:—

“ In the April 1911 issue of the ‘ Quarterly Journal of Forestry,’ the official organ of the Royal English Arboricultural Society, there appeared correspondence between the President, Mr. E. R. Pratt, and the Estate Duty Office on the question of estate duty on timber. In Section 61 (5) of the Finance Act 1910 the estate duty is payable on ‘ the net moneys after deducting all necessary outgoings.’ This was held by the Estate Duty Office to include ‘ the expenses of the sale, felling, and drawing out of the timber, and of restoring fences, ditches, roads and gates injured by the drawing out of such timber.’

“ It was pointed out by Mr. Pratt that if an owner is desirous of maintaining his woods in an economically sound condition, he must obviously have to replant the thinned out timber grounds, and that such cost should be allowed as a deduction. The reply was to the effect that this cost was *not* allowed as a deduction against Estate Duty or Succession Duty, and that this view would be enforced in a Court of Law.

“ Since the receipt of this ruling, however, the Society has received intimation from the Estate Duty Office that it is now agreed that ‘ the expense of replanting timber sold and felled *will* be allowed as a necessary outgoing to the maintenance of a timber estate.’

“ This is an important point and must give encouragement to the desire for private economic afforestation. It is also an achievement for the Royal English Arboricultural Society of which the President has every right to feel proud, and a concession which will be appreciated by every tree grower.”

VAGARIES OF TEMPERATURE.

British gardeners are constantly complaining of the weather and of rapid variations of temperature. What would they say to the state of things disclosed by the following extract of a letter from a glorious garden in Bulgaria, where the collection of plants is almost, if not indeed quite, equal to any to be found in Europe? “ What extraordinary weather you must have had in England! Here also it has been the same. Then came a deep snowstorm, so heavy that even large chestnuts were split in two by the weight of snow on their leaves. Then followed some days of frost and cold at night, and the variations of temperature were so interesting that I send you them:—

Date	Maximum		Minimum	
	Centigrade	Fahrenheit	Centigrade	Fahrenheit
Oct. 18	18°·5	(65°·3)	—0°·5	(31°·1)
" 14	18°	(64°·4)	—2°	(28°·4)
" 15	19°	(66°·2)	—2°	(28°·4)
" 16	10°	(50°)	—4°	(24°·8)
" 17	5°	(41°)	—1°	(30°·2)
" 18	9°	(48°·2)	—1°·5	(29°·8)
" 19	12°	(53°·6)	—2°	(28°·4)
" 20	13°	(55°·4)	—3°	(26°·6)
" 21	15°	(59°)	—2°	(28°·4)
" 22	17°	(62°·6)	—1°·5	(29°·8)
" 23	17°	(62°·6)	0°	(32°)
" 24	20°	(68°)	+5°	(41°)

From the 17th the rise of the maximum and the fall of the minimum is very curious."

ASTERS IN DRY WEATHER.

The season of 1911 will long be remembered for its great heat and drought, and the consequent effect on plant life. On the hot light soil at Wisley, keeping the hoe continually working did more good than all the watering and mulching by reducing evaporation from the soil, and most plants, including vegetables, did well. But although all the collection of Asters (Michaelmas Daisies) grew strongly and freely until the flower buds formed, mildew attacked the majority of the plants, some worse than others. Most of those varieties marked "bad" in the following list opened a large proportion of their flowers, but they were smaller than usual, and those marked "very bad" in the majority of instances were quite a failure so far as flowering goes. Those merely named were but slightly attacked. The varieties in the collection not named at all were free from mildew.

The collection of asters is a very large one and contains all the best varieties. A practically complete list of varieties grown will be found in our JOURNAL, vol. xxxiii., p. 184.

None of the pink or reddish flowered varieties such as 'Lil Fardell' were touched by mildew, though side by side with diseased plants.

'Albion,' very bad; 'Antigone,' very bad; 'Apollo,' bad; 'Argus'; 'Ariadne,' very bad; 'Berenice,' very bad; '*canus*,' very bad; 'Captivation'; 'Catulus'; 'Ceres'; 'Collerette blanche'; '*cordifolius giganteus*'; 'Daisy Peters,' very bad; 'D. B. Crane'; '*decorus*'; '*densus*,' bad; '*dumosus*,' bad; 'Elsie Perry'; '*eminens*,' very bad; '*formosissimus*,' very bad; 'Gloriosa'; 'Harpur Crewe,' very bad; 'Horace,' bad; 'Irene'; 'Janus'; 'Keston Blue'; '*lilacinus*,' very bad; '*litoreus*,' bad; 'Maud'; 'Mavourneen,' bad; 'Miss Parish'; 'Mrs. Alec Anderson,' bad; 'Mrs. Twinan,' bad; 'Mrs. Wheeler Bennett,' slightly; 'Moonstone'; 'Nancy'; '*paniculatus laxus*,' very bad; 'Photograph'; 'Pink Daisy,' very bad; 'Porcelain,' slightly;



FIG. 107. RHODODENDRON INDICUM ALBUM.

(*Proc. Ind. Soc.* p. 392.)



FIG. 108.—*CORIOPHYNE CRISTATA ALBA*.

'*ptarmicoides*' ; ' *puniceus*,' bad ; ' Purity,' very bad ; ' St. Patrick ' ; ' *salicifolius* ' ; ' Silver Queen ' ; ' Snowdrift ' ; ' Sophia Arnold,' slightly ; ' Thirza ' ; ' Tresserve ' ; ' *versicolor albus*,' very bad ; ' White Queen ' ; ' White Queen of the Dwarfs,' very bad ; ' White Spire ' ; ' White Spray ' ; ' Winnie Brazier.'

RHODODENDRON INDICUM ALBUM AND COELOGYNE CRISTATA ALBA.

The kindness of two of our Fellows enables us to reproduce illustrations of two examples of excellent cultivation, one in the open, the other under glass.

The former represents *Rhododendron indicum album* (= *Azalea indica alba*) in the garden of Austin Mackenzie, Esq., of Canadale, Argyllshire. It is a bush 5 feet 6 inches in height, and with a diameter of 15 feet 6 inches. It flowers profusely every year (fig. 107).

The latter, illustrating *Coelogyne cristata alba*, was sent by Lieut.-Col. H. Powys Greenwood, of Whitsbury House, Salisbury, who also contributes the following notes:—

" This plant of *Coelogyne cristata alba* was bought from Mr. Bull of Chelsea in 1891, a small plant with two leads in a six-inch basket. It now occupies more than a square yard of space, and was this year (1911) covered with spikes, many of them having six flowers, evenly distributed over the surface.

" The Albino variety of *C. cristata* must be one of the purest white flowers known, and this whiteness is greatly enhanced by contrast with the intensely deep green of the leaves.

" The culture of this Orchid is so well known that it calls for little remark; it should be kept in the cool house, and, although some growers advocate taking it into the intermediate house for a few weeks before the flowers open, I have never found it necessary. It delights in plenty of water during growth, to which the occasional addition of a little weak liquid manure is a great benefit, causing the pseudo-bulbs to swell well, and giving to the leaves that dark, rich colour which contrasts so delightfully with the purity of the flowers. When in bloom the plant may be brought into the drawing-room or hall, and will last from a fortnight to three weeks in perfection, the rest thus obtained being a benefit rather than the reverse " (fig. 108).

SWEET PEAS AT WISLEY, 1911.

SEVENTY stocks of sweet peas were sent in. The seeds were sown in small pots under glass in ordinary soil in February, four or five seeds in a pot. Immediately after germination they were stood out on a sheltered and warm border, and transferred to their permanent quarters on March 15, being planted in clumps. The plants were examined by the Committee on July 14, when several received Awards of Merit. Several varieties were also commended on account of their strong growth, and because of their non-burning qualities. These varieties withstood the tropical sunshine without losing colour or burning, and so added immensely to their value for garden decoration. Many of these had already received awards as show flowers. Many other varieties grown, unless shaded, are practically useless for ordinary garden decoration. They are indicated by the sign **P** below.

America Spencer.—A very vigorous and free-flowering variety, having large flowers with a white ground striped with crimson.

Asta Ohn, **P**.—A good large lavender flower. Habit vigorous and free.

Apple Blossom Spencer, **P**.—The standards of this variety are rose, and the wings blush-pink over a white ground. A very vigorous grower bearing an abundance of flowers.

Aurora Spencer, **P**.—A strong grower, producing quantities of very pretty creamy-white flowers, flaked and mottled with salmon-pink.

Arthur Green.—A good dark variety, having standards of dark maroon and wings of maroon violet.

Black Knight.—A deep maroon variety, which although not quite so vigorous at Wisley as others, produced an abundance of bloom.

Bolton's Pink.—A large bold flower of excellent shape and size, and of a lilac-rose colour. Very vigorous and free-flowering in habit.

Clara Curtis.—A fine waved primrose variety of great vigour.

Colleen, **P**.—A charming variety, having very pale Tyrian rose wings and rosy cochineal carmine standards.

Constance Oliver.—Resembles 'Countess Spencer,' but has a cream ground. It is vigorous in habit and free in flowering.

Countess Spencer, **P**.—A true stock. The large wavy standard and the wings are pale blush-pink, and the edges are of a slightly darker shade.

Dainty Spencer.—Synonymous with 'Elsie Herbert' (see below).

Dazzler.—A very striking variety of a bright orange colour. Very vigorous in habit.

Dobbie's Sunproof Crimson, **A.M.** June 21, 1910, **P**.—A wonder-

fully free-flowering crimson Spencer Sweet Pea, which remained unscorched during the very hot and trying weather of July, although in a position where they obtained a maximum amount of sun.

Dobbie's Mid-Blue, **A.M.** June 23, 1908.—A deep sky-blue flower of medium size, with an erect standard. It is a vigorous grower and free-flowering in habit.

Dorothy Eckford, **A.M.** September 2, 1902, **P.**—A splendid white Sweet Pea of vigorous growth, and very useful for cutting.

Earl Spencer, **A.M.** July 19, 1910.—A vigorous-growing variety of a rich orange-salmon colour, which requires shading in very sunny weather.

Elfrida Pearson, **A.M.** July 19, 1910, **P.**—A very large pale pink flower of great beauty. The habit of the plant is very vigorous and free-flowering.

Edrom Beauty.—A fine orange-salmon variety, which produced an abundance of bloom, although the plants were not quite so vigorous as some of the other sorts grown.

Elsie Herbert, **A.M.** July 9, 1907, **P.**—This variety is the same as 'Dainty Spencer,' and has large white flowers edged with deep rose.

Ethel Roosevelt.—A primrose flower, flaked with blush-crimson. It is free-flowering in habit, but not so vigorous as others at Wisley.

Etta Dyke, **P.**—A splendid white variety with waved standard. It is most useful for cutting, and flowers very freely.

Evelyn Hemus, **A.M.** June 25, 1907.—A cream-coloured flower, with a broad rose edge. It is a vigorous variety producing plenty of bloom.

Flora Norton Spencer.—A light blue flower with a waved standard.

Frank Dolby.—A large-flowered lavender variety, having a vigorous habit, and producing an abundance of bloom.

Gladys Unwin, **P.**—An exceptionally vigorous variety at Wisley, having pale rosy-pink flowers of excellent form.

Hannah Dale.—A rich maroon flower, with an erect standard.

Helen Lewis.—The flowers of this striking variety are large and bright orange-salmon in colour. It is a vigorous grower.

Helen Pierce, **A.M.** July 14, 1911.—This very strong-growing and free-flowering variety has flowers with a pure white ground, veined and mottled with bright blue. The standard is erect and the variety is splendid for cutting.

Ivanhoe, **A.M.** June 21, 1910, **P.**—This is one of the finest mauve Sweet Peas yet raised. The standard has a suffusion of pink over the prevailing soft heliotrope-mauve. Grown in clumps, it is a most effective decorative variety.

Isobel Malcolm, **P.**—An exceptionally vigorous variety, having great quantities of ivory-coloured flowers of remarkable quality and beauty.

James Grieve.—A bright, primrose flower. The plants of this variety unfortunately proved rather weak at Wisley.

Jessie Cuthbertson.—A good Sweet Pea with a creamy-white ground marbled with dull crimson. It is vigorous and free-flowering in habit.

John Ingman.—An excellent flower of large size. It is rich rose-carmine with veins of a deeper shade.

King Edward VII.—A bright crimson variety of great decorative value. It is vigorous in growth and produces large quantities of bloom.

King Edward Spencer.—A large crimson flower of good form.

Lady Althorp, **P.**—A good white variety tinged with very pale peach blossom which appears to fade in strong sunlight. It is vigorous and free-flowering in habit.

Lady G. Hamilton, **A.M.** July 14, 1896.—A splendid decorative Sweet Pea of a beautiful lavender colour.

Lord Nelson.—A vigorous variety having navy blue flowers of good size with erect standards.

Marbled Blue.—This charming variety has large flowers with a whitish ground much marbled with deep lobelia blue. The blooms are borne on long stalks and are produced abundantly.

Marie Corelli, **A.M.** July 14, 1911.—A bright rose-coloured variety with a white base to the waved standard. It is most free in flowering and of robust habit.

Marjorie Willis.—A very striking variety of good form and size being Tyrian rose in colour with a tinge of salmon in the standards when first opened. This variety unfortunately proved rather weak in habit at Wisley.

Martha Washington.—This did not prove quite so vigorous a grower as some of the varieties at Wisley. It has flowers with a pearly-white ground edged with rose which flushes to the centre of the standard and wings.

Masterpiece, **A.M.** July 6, 1909.—A magnificent lavender Spencer Sweet Pea of large size and great beauty. Grown in clumps it is especially useful for garden decoration.

Menie Christie.—A vigorous grower having the standards purplish-carmine and the wings clear rosy-magenta.

Mrs. A. Ireland.—A good vigorous variety having a bright rose-pink standard with a creamy base. The wings are blush-pink. It is very free-flowering in habit.

Mrs. C. W. Breadmore.—Although not very vigorous in growth this variety produced some very fine flowers with a creamy-buff ground edged with rich rose.

Mrs. Charles Foster.—A fine waved lavender variety which did not grow quite so vigorously as some of the other varieties at Wisley.

Mrs. Collier, **P.**—A good primrose-coloured flower of excellent form and substance.

Mrs. Hardcastle Sykes.—A vigorous variety producing an abundance of lovely blush-pink flowers.

Mrs. Hugh Dickson, **A.M.** July 6, 1909.—Pale salmon-pink on a cream ground. A vigorous grower and free-flowering.

Mrs. Geo. Charles.—A dark blue flower with a waved standard.

Mrs. Routzahn.—A charming flower combining shades of pink and faint apricot. It is very free-flowering in habit.

Nancy Perkin.—A very striking salmon-coloured variety, slightly paler than 'Earl Spencer.' It makes a good decorative feature when grown in clumps.

Nora Unwin.—A good white waved variety, especially useful for cutting.

Nubian, **A.M.** July 14, 1911.—The flowers of this splendid variety are chocolate-maroon in colour and large in size. They are borne in great abundance on long stems.

Othello Spencer.—A dark maroon flower of large size and good shape. The variety is a strong grower.

Paradise Ivory.—An ivory-white variety of great beauty.

Prince Olaf. A good Sweet Pea with a white ground marbled with clear blue. It is a very effective decorative flower, and the variety has a robust habit.

Princess Victoria, **A.M.** July 9, 1907. **P.**—This charming waved variety has a lovely pink standard and wings of clear blush-pink. It is a vigorous grower and an abundant bloomer.

Queen Alexandra.—A bright crimson-scarlet variety of very free-flowering habit. The blooms are large, and are borne on long stems.

Queen of Spain Spencer, **A.M.** July 14, 1911.—A beautiful pink variety, which flowered well, but did not make so much growth as some varieties. It is very valuable for cutting, being of large size and of excellent shape and form.

Rose du Barri.—A carmine-rose flower, with a tinge of terra-cotta. This variety was not so vigorous as some, but it flowered well.

Senator Spencer.—The flowers of this very distinct variety have a light ground striped with claret and chocolate.

St. George, **A.M.** July 9, 1907.—A bright orange-scarlet flower of great decorative value.

Tennant Spencer, **P.**—A splendid purplish-mauve variety, having large flowers and a robust habit.

The King, **A.M.** June 23, 1908.—A magnificent crimson Spencer variety, which unfortunately was badly scorched by the brilliant sunshine of July.

The Marquis.—A rosy-heliotrope flower of great beauty. The variety was not so vigorous as some others at Wisley.

Tom Bolton.—A grand dark maroon Sweet Pea of large size. The blooms were produced in great abundance.

Yankee.—A vigorous and free-flowering variety, having a white ground, much striped with crimson.

ASPARAGUS AT WISLEY, 1911.

EIGHT stocks of Asparagus seed were sent in for trial in February 1908, and all were sown in rows in freshly dug ground, and germinated well. The young plants were planted out the following season in thoroughly prepared beds, three rows on each bed, at a distance of 18 inches from plant to plant, selecting only the very strongest plants for this purpose. Beds were also planted for forcing purposes and were lifted and forced last winter. They all did remarkably well and it is interesting to note that those which received awards from the Committee as exceptionally good varieties for early cutting from the open were not the earliest for forcing. The variety 'Mammoth' proved to be quite a fortnight earlier than the rest as a forcing variety.

F.C.C. = First-class Certificate.

A.M. = Award of Merit.

Conover's American Colossal (Barr).—Stalks 6-8 inches long; only slightly tapering; scales well closed; a very good early forcing variety; gives a medium crop out-of-doors, but is not so vigorous as some of the other varieties on trial.

Conover's Colossal (R. Veitch), **F.C.C.** May 1. 1872.—Stalks about 6 inches long; non-tapering; scales well closed; gives a good crop in the open and makes medium growth.

Early Giant Argenteuil (J. Veitch).—Stalks 6-8 inches long; fairly uniform in thickness; scales well closed; an excellent variety, making very vigorous growth out-of-doors.

Early Giant French (J. Veitch), **A.M.** May 9, 1911.—Stalks 6-8 inches long; rather tapering; scales well closed; does better in the open than under glass; a vigorous grower, giving a large crop.

Green Canadian (Barr), **A.M.** May 9, 1911.—Stalks about 6 inches long; uniform in thickness; scales well closed; a very strong growing variety.

Late Giant Purple Argenteuil (Barr).—Stalks 6-8 inches long; of uniform thickness, with fairly well-closed scales; not so vigorous as the other varieties.

Mammoth (Barr).—Stalks about 6-8 inches long; hardly tapering at all; scales well closed; an excellent variety for forcing, being ready a fortnight before any other variety; gives a good crop in the open, but is not a very vigorous grower.

New White (Barr).—Stalks 6-8 inches long; of uniform thickness; scales well closed; a splendid forcing variety and a good strong grower in the open.

CUCUMBERS AT WISLEY, 1911.

FIFTY-THREE stocks of Cucumbers were sent for trial. All were sown singly in pots on April 17, and afterwards planted on mounds on a well-prepared bed. The plants in most cases made good growth.

None of the fruits were thinned until seen by the Committee, but it was quite evident in some of the smooth varieties that it is necessary to thin in ordinary cultivation. This was not so with those of the 'Rochford' or 'Lockie's Perfection' types, which planted on the same day and treated in exactly the same manner were carrying six and in many cases eight properly developed fruits, thus proving their value from a grower's point of view.

1.* A1 (Sutton).—A medium sized fruit of the 'Telegraph' type; 13 inches long; with white spines and little or no neck; a medium bearer. Foliage large and very dark green.

2. Aviator (J. Veitch).—A good cucumber of the 'Telegraph' type about 16 inches long with a short neck and white spines. The plants carried a fair crop.

3. Balham (Sydenham).—This variety, of which the seed came from India, grew very freely and produced an abundance of dark green foliage but failed to set any fruit.

4. Blair's Prolific (Dickson, Brown & Tait).—The seed of this variety was sown on the same date as the other varieties, but on the day most of the other varieties were ready the plants were only just showing fruits of the model type. It is of no value for market work.

5. Cardiff Castle (Carter).—A variety of the 'Telegraph' type, having medium, thick fruits with a long tapering neck; spines few and white; a very free bearer.

6. Cardiff Castle (J. Veitch).—Similar to the above except that it is a little darker in colour and has a slightly shorter neck.

7. Challenger (J. Veitch).—A very large variety of the 'Telegraph' type with practically no neck; length 18 inches; spines few and white. Unfortunately this did not prove to be a very prolific bearer.

8. Coronation (Mortimer).—A large 'Telegraph' variety with hardly any neck and a few white spines; length 21 inches; thick; not a very free cropper.

9. Covent Garden Favourite (Sydenham). **A.M.** April 9, 1889.—A medium sized variety of the 'Rochford' type about 14 inches long; ribbed; spines white; neck short.

10. Cynosure (Mortimer).—A large, short-necked 'Model' cucum-

* All trials in the Wisley Garden are carried out under number only until judging is completed. The number prefixed to the name of the variety in the Report corresponds with that by which alone the variety was known until judgment had been given. Fellows visiting the Garden and noticing any plant under a number can easily ascertain its name later by reference to the Report in the Journal.

ber, about 21 inches long, tapering towards the tip. It is a free bearer and has a few white spines.

11. *Delicacy* (Barr).—A medium sized cucumber of the 'Model' type, 14 inches long, with no neck; almost spineless; not a prolific bearer.

12. *Delicacy* (Sutton).—A fruit of the 'Rochford' type 16 inches long, having no neck and white spines; it is a fair bearer but most of the fruits were of a very bad shape.

13. *Duke of Edinburgh* (Carter), **F.C.C.** September 3, 1873.—A ribbed cucumber 19 inches long with white spines and a long neck. It is a good bearer and of the 'Telegraph' type.

14, 15. *Every Day* (Barr, Sutton), **F.C.C.** March 8, 1898.—A short thick 'Model' cucumber 12 inches long with a short neck and a few white spines; a medium cropper.

16. *Every Day* (R. Veitch).—A medium sized fruit of the 'Telegraph' type with a short neck and a few white spines; not a free bearer.

17. *Famous* (Barr), **A.M.** May 22, 1901.—A somewhat ribbed 'Telegraph' cucumber 17 inches long; neck short; spines white; a shy cropper.

18. *Her Majesty* (Toogood).—A medium sized fruit, 17 inches long, of the 'Telegraph' type; spines few and white; a fair cropper.

19. *Iceberg* (Toogood).—A small ribbed 'Model' variety about 1 foot long with a few white spines and a very short neck; not a heavy bearer.

20. *Ideal* (Carter).—A useful medium sized 'Model' cucumber with a dark green skin and a few white spines; a good bearer.

21. *Ideal* (Barr).—A small fruit of the 'Model' type; no neck and about 10 inches long; spines white; apparently a rather late variety and not a heavy cropper.

53. *Ideal Improved* (Beckett).—An excellent exhibition cucumber of the 'Model' type; 14 inches long; with a practically smooth dark green skin and no neck; a prolific bearer.

22. *King George* (Sutton).—A ribbed cucumber, 16 inches long with white spines and a short neck; of the 'Telegraph' type; not a big cropper.

23. *Lockie's Perfection* (Carter, J. Veitch), **F.C.C.** June 12, 1888.—A medium sized variety of the 'Model' type with no neck and a very few white spines; a good bearer.

25. *Lord Roberts* (Sydenham).—A medium fruit of the 'Model' type tapering to a broad point; neck short; spines few and white, not a heavy cropper.

26. *Lord Roberts* (J. Veitch).—A long ribbed variety of the 'Model' type with no neck and a few white spines; a poor cropper.

27. *Matchless* (Sutton), **F.C.** August 11, 1891.—A small dark green 'Model' cucumber with no neck and a few white spines; a prolific cropper.

28. *Matchless* (extra selected) (Barr).—Similar to No. 27.

29. Model (Carter).—A medium sized ribbed variety tapering towards the tip; neck very short; spines white; a fair cropper.

30. Northern Beauty (Dickson, Brown & Tait).—A short variety of the 'Model' type with no neck; spines white; not a heavy cropper.

31. Peerless (Sutton).—A large 'Model' cucumber 16 inches long; slightly ribbed; no neck; spines white; a poor cropper.

32. Pride of the Market (Barr), **A.M.** June 20, 1911.—An excellent medium sized fruit 14 inches long; ribbed; neck rather long; spines blackish; of the 'Rochford' type and a prolific bearer.

33. Pride of the Market (Sutton).—A medium sized 'Rochford' variety, 14 inches long, with white spines and no neck; ribbed; a good cropper.

34. Prizewinner (Sutton).—A rather thin cucumber of the 'Telegraph' type, 14 inches in length; ribbed; practically spineless; neck very short; a poor bearer.

35. Prolific Ridge (Toogood).—A ridge variety with dark foliage of vigorous growth; fruit of medium size with rather a long neck; spines black; a shy bearer.

36. Purley Park Hero (Barr), **F.C.C.** August 26, 1884.—A medium sized 'Telegraph' variety 14 inches long; with a short neck and white spines; ribbed; a good cropper.

37. Reliance (Sutton).—A large cucumber of the 'Model' type; length 16 inches; neck very short; spines few and white; a fair bearer.

38. Rochford's Market (Disease resisting) (Carter).—A fruit of medium size, 14 inches long and ribbed; neck long; spines white; a fairly heavy cropper.

39. Rollison's Telegraph (J. Veitch).—An example of the 'Telegraph' type 15 inches long, slightly ribbed; spines white; crop poor.

40. Royal Osborne (Carter).—A medium fruit of the 'Model' type, 15 inches long with no neck and of a light green colour at the top; spines white; a heavy bearer.

41. Satisfaction (Sutton).—A cucumber of the 'Model' type; 15 inches long with no neck; ridged; spines white; good crop.

42. Sensation (J. Veitch), **F.C.C.** July 12, 1898.—A splendid cucumber of large size 19 inches long with no neck and only a few spines which are white; slightly ridged; pale green in colour, and a prolific cropper.

43. Success Ridge (Toogood).—A strong growing ridge variety with very dark green foliage; fruit large, 9 to 10 inches long with practically no neck; spines black; a good cropper.

44. Telegraph (J. Veitch).—A medium sized variety 17 inches long; ridged; neck long; spines white; colour dark green; a prolific bearer.

45. Telegraph (Improved) (Sutton).—A variety of medium size, 18 inches long; slightly ridged; neck rather long; spines white.

46. Telegraph (Improved) (Dobbie).—A large cucumber with a

long tapering neck inclined to be light in colour; slightly ridged; spines few and white; a prolific cropper.

47. Telegraph (Improved) (Carter), **A.M.** June 20, 1911.—An excellent cucumber about 15 inches long, dark green in colour, slightly ridged; neck short; practically spineless and a heavy cropper.

48. Telegraph (Improved) (Barr).—This cucumber is smaller than the above and has a long neck and white spines. It is a fair bearer.

49. The Cambrian (Dickson, Brown & Tait).—A medium 'Model' variety about 14 inches long, light green in colour, smooth having very few spines and a short neck; a good cropper.

50. Unrivalled (Mortimer).—A large cucumber of the 'Telegraph' type with a long neck; ridged; spines white; not a very prolific bearer.

51. Unique (Barr).—A variety of the 'Telegraph' type, 16 inches long; neck long; spines blackish; ridged.

52. Worthing Favourite (Carter).—A short cucumber of the 'Telegraph' type with a long neck; light green in colour; smooth; spines very few white; a free cropper.

PEA TRIAL AT WISLEY, 1911.

ONE HUNDRED AND SIXTY-SEVEN stocks of peas were sent for trial. Three separate sowings of each were made on the dates mentioned below, all varieties being sown on the same day. They germinated well, and notes were made as to the time of germination, flowering, and readiness for picking. In one or two cases there was not enough seed for the third sowing.

By the following table it will be seen that with one or two exceptions the early varieties were all ready to pick on or about June 13.

"Ready Reckoner" (No. 112) was our earliest pea, fit to pick on June 3, and a fine pea of the marrow-fat type. "Holmes' Seedling, 19" (No. 125), of similar type was ready on June 4. Two others, "Exonian" (No. 42) and "Sangster's No. 1" (No. 116), were ready on June 6, followed by "Primo" on June 8 and "A1" on June 9.

Owing to the great heat it was impossible to give reliable dates when the late varieties were fit to pick in the last sowings.

The sowings were made on the following dates:—

1st Sowing.	March 8.
2nd ,,	April 21.
3rd ,,	May 22.

F.C.C. = First Class Certificate.

A.M. = Award of Merit.

VARIETIES.

*1. A.1.	20. Cotswold Hero.
2. Abundance.	21. Criterion.
3. Acme.	22. Daffodil.
4. Albion.	23. Daisy.
5. America.	24. Dawn.
6. American Wonder.	25. Debarbieux.
7. } Autocrat.	26. Discovery.
8. }	27. Dreadnought.
9. Battleship.	28. Duchess of York.
10. } Best of All.	29. Duchess of Albany.
11. }	30. Duchess of Albany (selected).
12. Bountiful.	31. Dwarf Defiance.
13. Borderer.	32. Early Duke.
14. British Columbia.	33. Early Dwarf.
15. Caledonia.	34. Early Hardy.
16. Centenary.	35. Early Morn.
17. Chancellor.	36. Eclipse.
18. Chelsea Gem.	37. Eight Weeks.
19. Continuity.	38. Evergreen Delicatesse.

* See footnote, p. 399.

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|--------------------------------|-----------------------------|
| 39. Exhibition. | 86. Lusitania. |
| 40. Excelsior. | 87. Magnum Bonum. |
| 41. Exhibition Marrowfat. | 88. Masterpiece. |
| 42. Exonian. | 89. Matchless Marrowfat. |
| 43. Empress of India. | 90. Mayflower. |
| 44. English Wonder. | 91. May Queen. |
| 45. Essex Wonder. | 92. Monster Podded. |
| 46. Eureka. | 93. Morton's Masterpiece. |
| 47. Fillbasket. | 94. Ne Plus Ultra. |
| 48. First of All. | 95. Onward. |
| 49. French Sugar. | 96. Paragon. |
| 50. Giant Express. | 97. Peerless Marrowfat. |
| 51. } Giant Lightning. | 98. Perfection Marrowfat. |
| 52. } | 99. Perpetual. |
| 53. Gladstone (selected). | 100. Pioneer. |
| 54. Gladstone. | 101. Pilot (re-selected). |
| 55. Glory of Devon. | 102. Premier. |
| 56. Godseff's Delicious. | 103. President. |
| 57. Goldfinder. | 104. } Primo. |
| 58. Golden Key. | 105. } |
| 59. Gradus. | 106. Prince of Wales. |
| 59A. Green Gem. | 107. Prince of Peas. |
| 60. Harbinger. | 108. Prizewinner. |
| 61. Harvestman. | 109. Producer. |
| 62. Hercules. | 110. } Quite Content. |
| 63. Hundredfold. | 111. } |
| 64. Ideal. | 112. Ready Reckoner. |
| 65. Incomparable. | 113. Reading Wonder. |
| 66. International. | 114. Rent Payer. |
| 67. James Burgess. | 115. Ringleader (improved). |
| 68. James G. Holmes. | 116. Sangster's No. 1. |
| 69. John Bunyan. | 117. Seedling Marrowfat. |
| 70. King Edward. | 118. Snowdrop. |
| 71. King of the Dwarfs. | 119. Standwell. |
| 72. Lancashire Lad. | 120. Stratagem. |
| 73. Lancastrian. | 121. St. Desirat. |
| 74. Langley Gem. | 122. Superb. |
| 75. Late Duke. | 123. } Superlative. |
| 76. Latest Giant. | 124. } |
| 77. } Laxtonian (re-selected). | 125. Seedling No. 19. |
| 78. } | 126. Seedling No. 43. |
| 79. } | 127. Seedling No. 44. |
| 80. } Little Marvel. | 128. Seedling No. 45. |
| 81. } | 129. Seedling No. 46. |
| 82. Little Wonder. | 130. Seedling No. 47. |
| 83. Lord Roberts. | 131. Bell's Premier. |
| 84. Late Queen. | 132. Talisman. |
| 85. Late Seedling. | 133. Telephone. |

134. Telegraph.	151. Unique.
135. The Canadian.	152. Vancouver.
136. The Caithness.	153. Vanguard.
137. The Celtic.	154. Veitch's Perfection.
138. } The Cottager.	155. Victor.
139. }	156. Western Express.
140. } The Cropper.	157. William the First (improved).
141. }	158. William Hurst.
142. } The Favourite.	159. World's Record.
143. }	160. Yorkshire Hero.
144. The Clipper.	161. Seedling No. 231.
145. The Mohican.	162. Seedling No. 209.
146. The Pilot.	163. Premier.
147. The Rosshire.	164. Prime Minister.
148. The Wisley.	165. The Miln.
149. Timperley Wonder.	166. Chatsworth.
150. Union.	167. Queen May.

1. A.1. (Sutton).—Height 4 feet; haulm light green, strong; pods single, light green, 3 inches long, eight medium-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 9
Second „ . .	May 10	June 8	July 6
Third „ . .	June 1	June 28	July 17

2. Abundance (Sutton), **XXX**, June 20, 1911.—Described vol. xxxvi., p. 711. Stock requires more selection.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 6	May 26	June 15
Second „ . .	May 8	June 8	July 6
Third „ . .	June 1	July 1	July 19

3. Acme (J. Veitch), **A.M.** July 8, 1898.—Described vol. xxxvi., p. 711.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 29	June 14
Second „ . .	May 10	June 8	July 6
Third „ . .	June 1	July 3	July 19

4. Albion (Holmes).—Height 3 feet; haulm dark green, weak; pods mostly in pairs, dark green, straight, $2\frac{1}{2}$ inches long, containing on an average eight large peas.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 30	June 28
Second „ . .	May 10	June 10	July 10
Third „ . .	June 2	July 6	—

5. America (Holmes), **A.M.** July 18, 1911.—Height 6 feet; haulm sturdy, dark green; pods in pairs, light green, 4 inches long, fairly straight; six to eight medium-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 3	June 26
Second „ . .	May 8	June 16	July 10
Third „ . .	June 2	July 10	July 24

6. American Wonder (Sutton).—Described vol. xxxvi., p. 711.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 13
Second „ . .	May 13	June 9	July 6
Third „ . .	June 2	June 30	July 17

7. Autocrat (Sutton), **F.C.C.** July 10, 1885.—Described vol. xxxvi., p. 724.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 7	July 7
Second „ . .	May 10	June 26	July 19
Third „ . .	June 1	July 17	—

8. Autocrat (J. Veitch), **F.C.C.** July 10, 1885.—Described vol. xxxvi., p. 724.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 7	July 15
Second „ . .	May 6	June 26	July 20
Third „ . .	June 1	July 17	—

9. Battleship (Barr).—Described vol. xxxvi., p. 719.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 1	June 26
Second „ . .	May 8	June 12	July 6
Third „ . .	June 1	July 8	July 26

131. Bell's Premier (Bell and Bieberstedt), **A.M.** July 18, 1911.—Height 4 feet; haulm light green, strong; pods single, light green, straight, 3 inches long, containing eight large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	Failed.	Failed.	Failed.
Second „ . .	May 10	June 9	July 10

10. Best of All (Barr).—Described vol. xxxvi., p. 719.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 3	July 3
Second „ . .	May 8	June 16	July 13
Third „ . .	June 2	July 12	—

11. Best of All (Sutton).—Described xxxvi., p. 719.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 7	June 3	June 29
Second „ . .	May 8	June 16	July 15
Third „ . .	June 2	July 6	Failed

13. Borderer (Holmes).—Height 5 feet; haulm sturdy but thin, light green; pods mostly single, light green, 2½ inches long, straight; six to eight large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 7	May 26	June 19
Second „ . .	May 6	June 8	July 7
Third „ . .	May 31	June 30	July 22

12. Bountiful (Sutton).—Described vol. xxxvi., p. 711.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 29	June 13
Second „ . .	May 4	June 9	June 26
Third „ . .	June 1	June 30	July 24

14. British Columbia (Holmes).—Height 4 to 5 feet; haulm dark

green, weak; pods single, dark green, 4 inches long, curved; eight to ten large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	May 29	June 27
Second „	May 10	June 9	July 6
Third „	May 31	July 10	July 26

15. Caledonia (Holmes).—Height 4½ feet; haulm dark green, strong; pods in pairs, dark green, 3½ inches long; six to eight fair-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	May 31	June 19
Second „	May 10	June 13	July 10
Third „	June 1	July 7	July 26

16. Centenary (Sutton), **A.M.** July 5, 1901.—Described vol. xxxvi., p. 716.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 4	June 2	June 26
Second „	May 8	June 13	July 12
Third „	June 1	July 11	—

17. Chancellor (Yates).—Height 3½ feet; haulm sturdy, dark green; pods in pairs, dark green, 3 inches long; six rather small peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	June 3	June 26
Second „	May 8	June 16	July 12
Third „	June 2	July 12	—

166. Chatsworth (Mack and Miln).—Height 5½ feet; haulm light green, weak; pods single, light green, straight, 2 inches long, containing four large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	—	—	—
Second „	May 5	June 19	July 14
Third „	June 1	July 14	—

18. Chelsea Gem (J. Veitch), **F.C.C.** July 1, 1887.—Described vol. xxxvi., p. 711.

	Above ground.	First flower.	Ready to pick.
First Sowing	March 31	May 26	June 21
Second „	May 6	June 8	June 27
Third „	June 1	June 30	July 20

19. Continuity (Sutton).—Height 3 feet; haulm dark green, strong; pods mostly single, dark green, 2 to 3 inches long, straight; six good-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	June 6	July 3
Second „	May 10	June 19	July 14
Third „	June 6	July 14	—

20. Cotswold Hero (Morton).—Height 4 feet; haulm dark green, sturdy; pods in pairs, dark green, straight, 3½ inches long; seven good-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	June 3	June 20
Second „	May 10	June 19	July 10
Third „	June 1	July 13	—

21. Criterion (J. Veitch).—Height 4 to 5 feet; haulm dark green, weakly; pods single, dark green, straight, 2 inches long; six or seven small peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 31	June 19
Second „ . .	May 10	June 10	July 6
Third „ . .	May 31	July 8	July 24

22. Daffodil (Carter), **A.M.** June 30, 1908.—Described vol. xxxiv., p. 288.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 29	June 25
Second „ . .	May 11	June 12	July 10
Third „ . .	June 3	July 6	July 20

23. Daisy (Carter), **F.C.C.** July 11, 1902.—Described vol. xxvi., p. 227.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 3	July 6
Second „ . .	May 11	June 9	July 12
Third „ . .	June 2	June 10	July 26

24. Dawn (Carter), **A.M.** June 30, 1908.—Described vol. xxxiv., p. 288.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 31	June 19
Second „ . .	May 6	June 10	July 7
Third „ . .	June 2	July 8	July 21

25. Debarbieux (Barr).—Height 3 feet; haulm dark green, sturdy; pods in pairs, light green, straight, 2 to 3½ inches long, containing five to six fair-sized peas.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 8	June 8	July 8
Second „ . .	May 6	June 26	July 17
Third „ . .	May 31	July 16	—

26. Discovery (Sutton).—Described vol. xxxvi., p. 716.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 2	June 29
Second „ . .	May 8	June 14	July 11
Third „ . .	June 2	July 10	July 26

27. Dreadnought (Carter).—Described vol. xxxvi., 724.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 7	July 7
Second „ . .	May 10	June 21	July 19
Third „ . .	June 2	July 15	—

28. Duchess of York (Sutton), **A.M.** June 30, 1901.—Described vol. xxxvi., p. 712.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	March 31	May 29	June 16
Second „ . .	May 5	June 8	June 30
Third „ . .	May 31	July 6	July 19

29. Duke of Albany (Barr), **A.M.** July 5, 1901.—Described vol. xxix., p. 681.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 7	June 1	June 28
Second „ . .	May 6	June 13	July 7
Third „ . .	May 31	July 7	July 24

30. Duke of Albany (selected) (Sutton), **A.M.** July 5, 1901.—Described vol. xxxvi., p. 716.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 7	June 2	June 28
Second „ . .	May 8	June 14	July 7
Third „ . .	June 2	July 10	—

31. Dwarf Defiance (Sutton). **A.M.** July 5, 1901.—Described vol. xxxvi., p. 716.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 6	June 5	July 6
Second „ . .	May 10	June 19	July 13
Third „ . .	June 1	July 12	—

32. Early Duke (Carter), **A.M.** July 5, 1910.—Height 4 feet; haulm light green, strong; pods mostly single, dark green, $3\frac{1}{2}$ inches long; eight medium-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 29	June 13
Second „ . .	May 10	June 19	June 27
Third „ . .	June 1	July 6	July 24

33. Early Dwarf (Sutton).—Described vol. xxxvi., p. 712.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 19
Second „ . .	May 10	June 9	June 30
Third „ . .	May 31	July 1	July 20

34. Early Hardy (Hancock).—Height $2\frac{1}{2}$ feet; haulm dark green, weak; pods mostly in pairs, dark green, straight, 2 inches long, containing seven large peas in a pod. Stock requires more selection.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 15	May 31	July 7
Second „ . .	May 8	June 9	July 10
Third „ . .	June 1	July 6	July 24

35. Early Morn (Carter), **A.M.** April 18, 1899, as a forcing variety; **XXX**, June 20, 1911.—Described vol. xxxiv., p. 288.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 13
Second „ . .	May 5	June 8	June 27
Third „ . .	May 31	June 28	July 17

36. Eclipse (Sutton).—Described vol. xxxiv., p. 288.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 13
Second „ . .	May 2	June 8	June 26
Third „ . .	May 31	June 26	July 17

37. Eight Weeks (Carter).—Described xxxvi., p. 712.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 21
Second „ . .	May 2	June 8	June 26
Third „ . .	May 31	June 27	July 17

43. Empress of India (Sutton), **XXX**, June 20, 1911.—Height 4 feet; haulm strong, light green; pods single, light green, 2 inches long; four very large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	March 31	May 26	June 14
Second „ . .	May 6	June 8	June 28
Third „ . .	June 2	July 3	July 21

44. English Wonder (Sutton).—Described vol. xxxvi., p. 713.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 30	June 27
Second „ . .	May 11	June 8	July 6
Third „ . .	June 2	July 6	July 19

45. Essex Wonder (J. Veitch). **A.M.** July 4, 1905.—Height 6 feet; haulm dark green, strong; pods mostly single, dark green, 4 inches long, straight; eight to ten small peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 2	June 26
Second „ . .	May 8	June 14	July 10
Third „ . .	May 31	July 8	July 26

46. Eureka (Sutton), **A.M.** July 18, 1911.—Described vol. xxxvi., p. 720.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 3	June 29
Second „ . .	May 10	June 14	July 12
Third „ . .	June 2	July 12	—

38. Evergreen Delicatesse (Carter), **A.M.** June 30, 1908.—Described vol. xxxiv., p. 289.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 4	June 6	June 28
Second „ . .	May 8	June 12	July 10
Third „ . .	May 31	July 11	July 26

40. Excelsior (Sutton), **A.M.** July 4, 1905.—Described vol. xxxvi., p. 713.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 19
Second „ . .	May 8	June 8	June 29
Third „ . .	May 31	June 29	July 17

39. Exhibition (Carter), **A.M.** August 16, 1910.—Described vol. xxxiv., p. 290.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 31	June 26
Second „ . .	May 10	June 12	July 10
Third „ . .	June 1	July 7	July 24

41. Exhibition Marrowfat (Sutton).—Described vol. xxxvi., p. 717.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 2	June 28
Second „ . .	May 10	June 16	July 13
Third „ . .	June 1	July 10	—

42. Exonian (R. Veitch), **A.M.** July 1, 1887.—Height 3 to 4 feet; haulm light green, weak; pods single and sparse, light green, straight, 1 to 1½ inch long; four or five large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	March 31	May 25	June 6
Second „ . .	May 6	June 8	June 28
Third „ . .	May 31	June 26	July 17

47. Fillbasket (Sutton), **F.C.C.** 1872.—Described vol. xxxvi., p. 717.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 2	June 27
Second „ . .	May 6	June 13	July 10
Third „ . .	May 31	July 8	July 26

48. First of All (Sutton).—Described vol. xxvi., p. 713.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	March 31	May 25	June 13
Second „ . .	May 8	June 8	June 26
Third „ . .	June 1	June 27	July 17

49. French Sugar (Sutton).—Height 6 to 6½ feet; haulm light green, weak; pods in pairs, light green, curved, broad, averaging five small peas in a pod; coloured flowers.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	March 31	June 6	July 6
Second „ . .	May 8	June 26	July 14
Third „ . .	May 31	July 6	—

50. Giant Express (Carter).—Described vol. xxxvi., p. 713.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 13
Second „ . .	May 2	June 8	June 28
Third „ . .	May 31	June 28	July 17

51. Giant Lightning (Carter), **XXX**, June 20, 1911.—Described vol. xxxvi., p. 713.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 14
Second „ . .	May 5	June 8	June 28
Third „ . .	June 1	June 26	July 17

52. Giant Lightning (Barr).—Described vol. xxxvi., p. 713.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 13
Second „ . .	May 5	June 8	June 26
Third „ . .	May 31	June 26	July 26

53, 54. Gladstone (selected) (Sutton, Sydenham).—Height 4 feet; haulm dark green, fairly strong; pods single dark green, slightly curved, 3 to 4 inches long, containing six to eight fair-sized peas.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 5	July 8
Second „ . .	May 9	June 11	July 16
Third „ . .	June 1	July 13	Aug. 19

55. Glory of Devon (R. Veitch), **A.M.** July 11, 1899.—Described vol. xxxvi., p. 720.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 3	July 1
Second „ . .	May 6	June 14	July 12
Third „ . .	June 2	July 13	—

56. Godseff's Delicious (Godseff).—Height 3 to 4 feet; haulm very dark green, slender; pods mostly in pairs, very dark green, straight, 2½ inches long, containing seven small peas. Stock requires more selection.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 6	June 3	June 28
Second „ . .	May 10	June 16	July 10
Third „ . .	May 31	July 8	July 26

58. Golden King (Barr).—Described vol. xxxvi., p. 717.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 6	June 1	June 26
Second „ . .	May 6	June 16	July 6
Third „ . .	May 31	July 7	July 24

57. Goldfinder (R. Veitch).—Described vol. xxxvi., p. 725.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 3	June 27
Second „ . .	May 10	June 19	July 14
Third „ . .	June 1	July 10	—

59. Gradus (Sydenham), **F.C.C.** July 1, 1887.—Described vol. xxxvi., p. 713.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 19
Second „ . .	May 8	June 16	July 1
Third „ . .	June 2	July 1	July 19

59A. Green Gem (Sutton), **A.M.** July 4, 1905.—Described vol. xxxvi., p. 713.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 26	June 19
Second „ . .	May 8	June 8	July 1
Third „ . .	June 2	July 6	—

60. Harbinger (Sutton), **F.C.C.** 1872.—Described vol. xxxvi., p. 713.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 7	May 25	June 19
Second „ . .	May 6	June 8	June 27
Third „ . .	June 2	June 28	July 17

61. Harvestman (Carter), **A.M.** June 30, 1908.—Described vol. xxxiv., p. 289.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	March 31	May 31	June 19
Second „ . .	May 10	June 15	July 7
Third „ . .	May 31	July 10	July 26

62. Hercules (Dickson and Robinson).—Height 5 to 6 feet; haulm light green, strong; pods in pairs, light green, straight, 3 inches long; six to eight large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 5	June 19
Second „ . .	May 6	June 15	July 10

63. Hundredfold (Sutton), **A.M.** July 5, 1910.—Described vol. xxxvi., p. 713.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 26	June 19
Second „ . .	May 8	June 8	June 30
Third „ . .	June 2	July 1	July 22

64. Ideal (Sutton), **F.C.C.** July 3, 1903.—Described vol. xxxvi., p. 713.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	April 25	June 13
Second „ . .	May 6	June 9	June 28
Third „ . .	May 31	June 26	July 19

65. Incomparable (Sutton).—Described vol. xxxvi., p. 717.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 4	June 3	June 28
Second „ . .	May 10	June 16	July 10
Third „ . .	June 2	July 14	—

66. International (Carter), **A.M.** June 30, 1908.—Described vol. xxxiv., p. 289. Stock requires more selection.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 1	June 19
Second „ . .	May 8	June 12	July 7
Third „ . .	June 1	July 7	—

67. James Burgess (Yates).—Height 2 feet; haulm dark green, strong; pods in pairs, dark green, straight, 3 to 4 inches long, containing six or seven good-sized peas.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 4	June 5	June 28
Second „ . .	May 10	June 19	July 12
Third „ . .	June 2	July 13	—

68. James G. Holmes (Holmes).—Height 1½ to 2 feet; haulm dark green, sturdy; pods in pairs, dark green, 2 inches long; on an average, six large peas in a pod. Stock requires more selection.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 4	May 26	June 26
Second „ . .	May 6	June 8	June 30
Third „ . .	June 1	July 1	July 17

69. John Bunyan (Laxton).—Height 2½ feet; haulm dark green, robust; pods mostly in pairs, dark green, straight, 2 to 3 inches long, averaging seven very large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 28
Second „ . .	May 6	June 8	June 30

70. King Edward (Sutton), **A.M.** July 18, 1911.—Described vol. xxxvi., p. 717. Stock requires more selection.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 31	June 14
Second „ . .	May 11	June 10	July 10
Third „ . .	June 7	July 3	Failed.

71. King of the Dwarfs (Sutton).—Described vol. xxxvi., p. 714.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	March 31	May 25	June 19
Second „ . .	May 10	June 8	June 27
Third „ . .	June 1	June 28	July 17

72. Lancashire Lad (Yates).—Height 1½ feet; haulm light green, strong; pods mostly in pairs, light green, curved, 3½ inches long, containing seven very large peas.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 4	May 29	July 1
Second „ . .	May 8	June 8	July 6
Third „ . .	June 1	July 6	July 24

73. Lancastrian (Dickson and Robinson).—Height 3 feet; haulm

fairly strong, very dark green; pods in pairs, dark green, straight, 3 to 4 inches; eight to nine large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	April 3	June 5	June 26
Second „ . . .	May 10	June 16	July 10
Third „ . . .	June 2	July 12	—

74. Langley Gem (J. Veitch).—Height 18 inches; haulm dark green, weak; pods single, dark green, 2½ to 3 inches long; six to eight large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	April 3	May 25	June 26
Second „ . . .	May 10	June 16	July 10
Third „ . . .	June 1	July 12	—

75. Late Duke (Carter), **A.M.** September 13, 1910.—Height 6 feet; haulm strong, light green; pods light green, mostly single, 2½ to 3 inches long, curved, pods containing eight to ten fair-sized peas.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	April 3	June 6	July 7
Second „ . . .	May 8	June 15	July 14
Third „ . . .	May 31	July 12	—

84. Late Queen (Sutton), **A.M.** July 10, 1900.—Described vol. xxxvi., p. 725.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	April 4	June 7	July 11
Second „ . . .	May 10	June 26	July 26
Third „ . . .	June 2	July 15	—

85. Late Seedling (Holmes).—Height 4½ feet; haulm slender, dark green; pods single, dark green, curved, 3 to 4 inches long, containing eight to ten fair-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	April 3	June 1	June 29
Second „ . . .	May 5	June 12	July 12
Third „ . . .	May 31	July 7	—

76. Latest Giant (Carter).—Height 3½ feet; haulm very dark green, strong; pods dark green, in pairs mostly, straight; seven nice-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	April 3	June 5	July 1
Second „ . . .	May 10	June 21	July 12
Third „ . . .	June 2	July 12	—

77, 78 Laxtonian (re-selected) (Carter, Laxton), **A.M.** July 5, 1910.—Described vol. xxxvi., p. 714.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	April 3	May 25	June 21
Second „ . . .	May 5	June 8	July 8
Third „ . . .	June 1	June 28	July 22

79, 80, 81. Little Marvel (Carter, Barr, Sutton), **A.M.** July 11, 1902.—Described vol. xxxvi., p. 714.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	April 3	May 29	June 19
Second „ . . .	May 8	June 8	June 29
Third „ . . .	June 2	July 5	July 19

82. Little Wonder (Laxton).—Height 1 to 1½ foot; haulm dark green, strong; pods usually single, dark green, 3 to 3½ inches long; on an average, six medium-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 15
Second „ . .	May 10	June 8	June 29

83. Lord Roberts (Sutton). **A.M.** July 18, 1902.—Described vol. xxxvi., p. 717.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 4	June 3	July 6
Second „ . .	May 10	June 14	July 13
Third „ . .	June 2	July 11	—

86. Lusitania (Dickson and Robinson).—Height 2½ feet; haulm very dark green; pods in pairs, dark green, 2 inches long, straight; six fair-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 6	July 1
Second „ . .	May 11	June 19	July 13
Third „ . .	June 3	June 14	—

87. Magnum Bonum (Sutton), **A.M.** August 16, 1910.—Described vol. xxxvi., p. 721.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 5	June 29
Second „ . .	May 10	June 16	July 10
Third „ . .	June 1	July 10	—

88. Masterpiece (Sutton).—Described vol. xxxvi., p. 721.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 2	June 29
Second „ . .	May 8	June 8	July 14
Third „ . .	June 1	July 13	—

89. Matchless Marrowfat (Sutton), **A.M.** July 18, 1911.—Described vol. xxxvi., p. 721.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 2	June 29
Second „ . .	May 8	June 8	July 14
Third „ . .	June 1	July 8	—

90. Mayflower (Carter).—Described vol. xxxiv., p. 289.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 29	June 14
Second „ . .	May 12	June 9	July 10
Third „ . .	June 2	July 3	July 22

91. May Queen (Sutton), **XXX**, June 20, 1911.—Described vol. xxxvi., p. 714.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 13
Second „ . .	May 3	June 9	June 26
Third „ . .	May 31	June 28	July 17

92. Monster Podded (Barr).—Height 6½ feet; haulm light green, weak; pods single, light green tinged with red, curved, 4 to 5 inches long, very broad; six to eight small sour peas in a pod; coloured flowers.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 6	July 6
Second „ . .	May 2	June 26	July 15
Third „ . .	May 30	July 15	—

93. Morton's Masterpiece (Morton).—Height 4 feet; haulm dark green, weak; pods single, light green tinged with red, straight, 3 to 3½ inches long, containing eight good-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 4	June 6	June 29
Second „	May 6	June 19	July 14
Third „	June 2	July 6	—

94. Ne Plus Ultra (Sutton).—Described vol. xxxvi., p. 722.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	June 3	June 28
Second „	May 8	June 19	July 12
Third „	June 2	July 13	—

95. Onward (Holmes).—Height 5½ feet; haulm light green, weak; pods mostly in pairs, light green, straight, 2 to 3 inches long; six to eight large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	May 26	June 21
Second „	May 6	June 8	July 6
Third „	May 31	July 3	July 21

96. Paragon (J. Veitch).—Height 18 inches; haulm weak, dark green; pods single, dark green, straight, 3 inches long, containing nine large peas. Stock requires more selection.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	May 25	June 29
Second „	May 8	June 8	July 3
Third „	June 1	July 1	—

97. Peerless Marrowfat (Sutton), **F.C.C.** July 14, 1903.—Described vol. xxxvi., p. 722.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	June 3	June 29
Second „	May 10	June 19	July 14
Third „	June 1	July 12	July 27

98. Perfection Marrowfat (Sutton).—Described vol. xxxvi., p. 722.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	June 3	June 29
Second „	May 8	June 14	July 13
Third „	June 7	July 15	Failed

99. Perpetual (Sutton).—Height 4 feet; haulm dark green, weak; pods mostly in pairs, dark green, straight, 3½ inches long, containing seven rather small peas.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 12	June 6	July 8
Second „	May 11	June 21	July 14
Third „	June 1	July 13	—

100. Pioneer (Sutton), **XXX**, June 20, 1911.—Described vol. xxxvi., p. 714.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	May 26	June 14
Second „	May 8	June 8	June 29
Third „	June 2	June 30	July 19

101. Pilot (re-selected) (Carter), **A.M.** July 3, 1903.—Described vol. xxxiv., p. 289.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	March 31	May 25	June 13
Second „ . .	May 6	June 8	June 26
Third „ . .	May 31	June 26	July 17

102. Premier (Dickson and Robinson).—Height 2 feet; haulm light green, weak; pods single, light green, straight, 2 to 3 inches long, containing six good-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	Failed.	Failed.	Failed.
Second „ . .	May 10	June 16	July 12
Third „ . .	June 3	July 14	—

163. Premier (Mack and Miln).—Height 5 to 6 feet; haulm strong, light green; pods single, light green, 3 inches long, slightly curved; six to eight rather small peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 4	May 31	June 19
Second „ . .	May 6	June 14	July 6
Third „ . .	May 31	July 6	July 24

103. President (Dickson and Robinson).—Height 3½ feet; haulm dark green, strong; pods mostly in pairs, dark green, 2½ inches long, straight, averaging nine large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 5	July 6
Second „ . .	May 11	June 21	July 17
Third „ . .	June 3	July 15	—

164. Prime Minister (Mack and Miln).—Height 3½ feet; haulm dark green, sturdy; pods single, dark green, 4 inches long, straight, containing eight fair-sized peas. Stock requires more selection.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 6	June 8	June 19
Second „ . .	May 8	June 27	July 24
Third „ . .	May 31	July 15	—

104, 105. Primo (Barr, J. Veitch).—Height 3½ feet; haulm not very strong, dark green; pods single, dark green, 3 inches long; six large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 1	May 25	June 8
Second „ . .	May 8	June 8	June 26
Third „ . .	May 31	June 28	July 19

107. Prince of Peas (Sutton), **A.M.** August 2, 1910.—Described vol. xxxvi., p. 717. Stock requires more selection.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 6	May 31	June 27
Second „ . .	May 10	June 12	July 10
Third „ . .	June 2	June 30	July 26

106. Prince of Wales (Sutton).—Described vol. xxxvi., p. 718.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 2	June 21
Second „ . .	May 10	June 13	July 10
Third „ . .	May 31	July 10	July 26

108. Prizewinner (Sutton), **F.C.C.** July 5, 1901.—Described vol. xxxvi., p. 718.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 12	June 6	July 10
Second „ . .	May 10	June 21	July 15
Third „ . .	June 2	July 14	—

109. Producer (Yates).—Height 4 feet; haulm dark green, strong; pods in pairs, dark green, straight, 2 inches long; five or six large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 2	June 26
Second „ . .	May 10	June 13	July 10
Third „ . .	June 2	July 8	July 24

167. Queen May (White).—Height 4½ feet; haulm light green, weak; pods mostly single, light green, straight, 3 to 4 inches long, containing eight large peas.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	—	—	—
Second „ . .	May 5	June 8	July 1
Third „ . .	June 1	July 8	July 17

110, 111. Quite Content (Carter, Barr), **F.C.C.** August 14, 1906.—Described vol. xxxiv., p. 290.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 2	June 27
Second „ . .	May 10	June 16	July 6
Third „ . .	June 2	July 10	July 26

112. Ready Reckoner (Holmes), **XXX** June 20, 1911.—Height 4½ feet; haulm strong, light green; pods single, light green, 2 inches long; six large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	March 31	May 25	June 3
Second „ . .	May 5	June 8	June 26
Third „ . .	May 31	June 26	July 17

113. Reading Wonder (Sutton).—Described vol. xxxvi., p. 714.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 15
Second „ . .	May 8	June 8	June 26
Third „ . .	June 1	July 1	July 17

114. Rent Payer (J. Veitch).—Height 3 feet; haulm weak, dark green; pods in pairs, dark green, straight, 3 inches long; eight fair-sized peas in a pod. Stock requires more selection.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 4	June 3	June 30
Second „ . .	May 10	June 19	July 15
Third „ . .	June 2	July 13	—

115. Ringleader (improved) (Sutton).—Height 5 feet; haulm light green, weak; pods in pairs, light green, 2 to 2½ inches long; six large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 29	June 10
Second „ . .	May 4	June 8	June 29
Third „ . .	May 31	July 3	July 19

116. Sangster's No. 1 (Sutton).—Described vol. xxxvi., p. 714.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	April 3	May 25	June 6
Second „ . . .	May 5	June 8	June 24
Third „ . . .	May 31	June 26	July 17

117. Seedling Marrowfat (Sutton).—Described vol. xxxvi., p. 714.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	April 3	May 25	June 19
Second „ . . .	May 8	June 8	June 29
Third „ . . .	June 1	July 1	July 19

161. Seedling No. 231 (Carter).—Height $6\frac{1}{2}$ feet; haulm dark green, strong; pods in pairs, dark green, straight, 3 inches long; six fairly large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	April 6	June 2	June 26
Second „ . . .	May 8	June 13	July 10
Third „ . . .	June 1	July 8	—

162. Seedling No. 209 (Carter).—Height 6 feet; haulm, dark green, strong; pods in pairs, dark green, 4 inches long, curved; eight to ten fair-sized sweet peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	April 3	May 31	June 26
Second „ . . .	May 10	June 10	July 10
Third „ . . .	June 3	July 6	July 24

125. Seedling No. 19 (Holmes).—Height $3\frac{1}{2}$ feet; haulm light green, fairly strong; pods single, straight, 2 to 3 inches long; six large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	March 31	May 25	June 4
Second „ . . .	May 10	June 8	June 26
Third „ . . .	May 31	June 26	July 19

126. Seedling No. 43 (Bell and Bieberstedt).—Height $3\frac{1}{2}$ feet; haulm dark green, sturdy; pods dark green, single, slightly curved, varying from 2 inches to $4\frac{1}{2}$ inches long, and containing six large peas.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	Failed.	Failed.	Failed.
Second „ . . .	May 10	June 8	July 19

127. Seedling No. 44 (Bell and Bieberstedt).—Height 3 feet; haulm dark green, sturdy; pods mostly in pairs, dark green, straight, $3\frac{1}{2}$ inches long, containing eight large sweet peas.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	Failed.	Failed.	Failed.
Second „ . . .	May 10	June 19	July 14

128. Seedling No. 45 (Bell and Bieberstedt).—Height 3 to 4 feet; haulm dark green, strong; pods mostly in pairs, dark green, straight, 3 to $3\frac{1}{2}$ inches long; eight to ten peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . . .	April 4	June 6	July 6
Second „ . . .	May 10	June 19	July 14

129. Seedling No. 46 (Bell and Bieberstedt).—Height 3 to 4 feet;

haulm dark green, strong; pods mostly in pairs, dark green, straight, 3 to 4 inches long; on an average, nine peas to a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 12	June 5	July 6
Second „	May 8	June 19	July 10

130. Seedling No. 47 (Bell and Bieberstedt).—Height 5 feet; haulm dark green, strong; pods in pairs, dark green, straight, 3 to 4 inches long; eight to ten large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 6	June 2	June 28
Second „	May 10	June 10	July 8

118. Snowdrop (Carter).—Height 4½ feet; haulm light green, weak; pods single, light green, straight, 2 to 3 inches long; six large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	May 25	June 14
Second „	May 8	June 8	June 28
Third „	May 31	June 28	July 20

119. Standwell (Sutton).—Height 5 feet; haulm dark green, strong; pods mostly in pairs, dark green, 3½ inches long, slightly curved; six medium-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	June 7	July 3
Second „	May 6	June 21	July 15
Third „	June 1	July 13	—

120. Stratagem (Sutton), **F.C.C.** August 14, 1879.—Described vol. xxxvi., p. 718.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 8	June 3	July 1
Second „	May 8	June 15	July 10
Third „	June 1	July 12	—

121. St. Desirat (Barr).—Height 6 to 7 feet; haulm light green, slender; pods single, light green, straight, 1 inch broad, 4 inches long, containing seven small peas.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	June 2	July 3
Second „	May 2	June 16	July 14
Third „	May 30	July 7	—

122. Superb (Laxton).—Height 2½ feet; haulm dark green, weak; pods in pairs, dark green, slightly curved, 3 inches long; eight even-sized large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	May 25	July 1
Second „	May 10	June 8	June 28
Third „	June 1	July 3	July 20

123, 124. Superlative (J. Veitch, Sutton), **F.C.C.** 1872.—Described vol. xxxvi., p. 718.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 4	June 3	July 1
Second „	May 10	June 16	July 12
Third „	June 1	July 7	—

132. Talisman (Sharp).—Height $3\frac{1}{2}$ to 4 feet; haulm light green, strong; pods single, light green, 2 inches long, straight; six very large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 13
Second „ . .	May 5	June 8	June 26
Third „ . .	May 31	June 26	July 17

133. Telephone (Sutton), **F.C.C.** June 27, 1878.—Described vol. xxix., p. 686.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 31	June 26
Second „ . .	May 10	June 13	July 7
Third „ . .	June 1	July 8	July 24

134. Telegraph (Sutton).—Described vol. xxxiv., p. 289.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 6	June 1	June 21
Second „ . .	May 5	June 14	July 6
Third „ . .	May 31	July 8	July 26

135. The Canadian (Holmes).—Height 3 feet; haulm light green, sturdy; pods single, light green, curved, 2 to 3 inches long, averaging eight large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 29	June 28
Second „ . .	May 10	June 10	July 14
Third „ . .	June 1	July 8	July 20

136. The Caithness (Holmes), **A.M.** July 18, 1911.—Height 5 to 6 feet; haulm strong, dark green; pods in pairs, dark green, curved, 3 to 4 inches long; six to eight large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 2	June 19
Second „ . .	May 10	June 13	July 8
Third „ . .	June 1	July 10	July 25

137. The Celtic (Holmes).—Height 5 feet; haulm light green, strong; pods in pairs, light green, 3 inches long, curved; six large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 8	May 29	June 26
Second „ . .	May 8	June 8	June 30
Third „ . .	June 1	July 1	July 24

144. The Clipper (Sydenham).—For description see vol. xxxvi., p. 718.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 2	June 19
Second „ . .	May 10	June 13	July 10
Third „ . .	June 2	July 10	July 26

138. The Cottager (Holmes).—Height $2\frac{1}{2}$ feet; haulm very strong, dark green; pods mostly in pairs, dark green, 3 inches long; eight fair-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 4	May 31	June 27
Second „ . .	May 10	June 8	July 8
Third „ . .	June 1	July 3	July 24

139. The Cottager (Yates), **A.M.** July 18, 1911.—Height 3 feet; haulm very dark green, strong; pods in pairs, dark green, curved slightly, $3\frac{1}{2}$ inches long, containing eight rather small peas.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 10	May 30	June 29
Second „ . .	May 8	June 9	July 12
Third „ . .	June 3	July 8	July 24

140, 141. The Cropper (Holmes).—Height 6 feet; haulm light green, strong; pods mostly in pairs, light green, curved a little, 2 inches long; eight to ten large sweet peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	March 31	May 25	June 12
Second „ . .	May 5	June 8	June 30
Third „ . .	May 31	June 26	July 17

142, 143. The Favourite (Holmes).—Height 5 to 6 feet; haulm light green, strong; pods single, light green, 2 to 3 inches long, curved; eight to ten large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 19
Second „ . .	May 6	June 8	July 6
Third „ . .	May 31	June 30	July 20

165. The Miln (Mack and Miln).—Height 3 feet; haulm dark green, weak; pods dark green, single, curved, 3 inches long; eight small peas in a pod. More selection required.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 4	June 8	July 6
Second „ . .	May 6	June 15	July 19
Third „ . .	May 30	July 12	—

145. The Mohican (Holmes).—Height $4\frac{1}{2}$ to 5 feet; haulm dark green; pods single, dark green, 4 inches long, straight; six to eight large peas in a pod. Stock requires more selection.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 2	June 29
Second „ . .	May 8	June 16	July 12
Third „ . .	June 1	July 10	—

146. The Pilot (Sutton), **A.M.** July 3, 1903.—Described vol. xxxvi., p. 715.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 13
Second „ . .	May 5	June 8	June 26
Third „ . .	May 31	June 27	July 19

147. The Ross-shire (Holmes).—Height 3 to 4 feet; haulm strong, dark green; pods in pairs, dark green, straight, 4 inches long; eight to ten very large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	June 3	July 1
Second „ . .	May 6	June 19	July 15
Third „ . .	June 7	July 13	—

148. The Wisley (Holmes).—Height $5\frac{1}{2}$ feet; haulm very strong,

dark green; pods single, dark green, 3 to 4 inches long, straight; six to eight medium-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 8	May 26	June 21
Second ..	May 10	June 8	June 30
Third ..	June 1	June 28	July 20

149. *Timperley Wonder* (Yates).—Height 15 to 18 inches; haulm sturdy, dark green; pods mostly single, dark green, 3 inches long; six large peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	May 26	June 19
Second ..	May 10	June 8	June 29
Third ..	June 6	July 2	July 21

150. *Union* (Holmes).—Height 4 to 5 feet; haulm moderately strong, light green; pods mostly single, light green, $3\frac{1}{2}$ inches long, curved; six to eight small peas in a pod. Stock requires more selection.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	May 29	June 26
Second ..	May 10	June 8	July 6
Third ..	May 31	July 1	July 21

151. *Unique* (Sydenham).—Height 3 to 4 feet; haulm dark green, strong; pods single, dark green, straight, 3 inches long; six to eight good-sized peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	June 2	July 1
Second ..	May 10	June 10	July 14
Third ..	June 2	July 7	July 24

152. *Vancouver* (Holmes).—Height 6 feet; haulm weakly, light green; pods single, light green, $2\frac{1}{2}$ inches long, straight; six to eight small peas in a pod.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	May 29	June 26
Second ..	May 10	June 8	July 6
Third ..	June 1	July 6	July 26

153. *Vanguard* (Sharp).—Height 4 feet; haulm light green, weak; pods light green, single, straight, 2 inches long, averaging five very large peas.

	Above ground.	First flower.	Ready to pick.
First Sowing	March 31	May 25	June 13
Second ..	May 5	June 8	June 26
Third ..	May 31	June 26	

154. *Veitch's Perfection* (Sutton).—Described vol. xxxvi., p. 724.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	May 29	July 10
Second ..	May 8	June 21	July 15
Third ..	June 2	July 12	

155. *Victor* (J. Veitch), **A.M.** July 5, 1910.—Described vol. xxxvi., p. 715.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	May 25	June 13
Second ..	May 13	June 8	July 3
Third ..	June 1	June 29	July 20

156. *Western Express* (R. Veitch), **A.M.** July 11, 1903.—Described vol. xxxvi., p. 715.

	Above ground.	First flower.	Ready to pick.
First Sowing	April 3	May 29	June 16
Second ..	May 8	June 8	July 7
Third ..	June 1	July 6	July 24

157. William the First (improved) (Sutton), **F.C.C.** 1872.—Described vol. xxxvi., p. 715.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	March 31	May 25	June 13
Second „ . .	May 8	June 8	June 29
Third „ . .	May 30	June 27	July 20

158. William Hurst (Sutton).—Described vol. xxxiv., p. 289.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 19
Second „ . .	May 10	June 8	June 30
Third „ . .	June 1	June 30	July 19

159. World's Record (Sutton), **XXX** June 20, 1911.—Described vol. xxxvi., p. 716.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 3	May 25	June 13
Second „ . .	May 5	June 9	June 26
Third „ . .	June 2	June 30	July 20

160. Yorkshire Hero (Sutton), **A.M.** August 16, 1910.—Described vol. xxxvi., p. 724.

	Above ground.	First flower.	Ready to pick.
First Sowing . .	April 4	June 2	June 29
Second „ . .	May 6	June 9	July 11
Third „ . .	June 2	July 7	July 26

MISCELLANEOUS VEGETABLES AT WISLEY, 1911.

BROAD BEAN.

Brookland's Prize Green Longpod (Deal).—Height, $2\frac{1}{2}$ feet; haulm, strong, light green; pods, light green, 8 to 10 inches long, containing on an average 6 large, sweet, full-sized beans.

RUNNER BEAN.

Empress (Deal).—A vigorous variety with curved pods of medium length; flavour good; crop fair; flowers scarlet and white.

Lady Byron (Newberry).—Growth vigorous; foliage and pods of medium size; crop poor; flowers scarlet.

Prince of Pengwern (Jackson).—A useful variety of vigorous habit with long straight pods of good flavour; crop good; flowers scarlet.

CABBAGE (1910-11).

Dreadnought (Wheeler).—A moderate grower producing a fairly good heart; leaves broad; inclined to be wrinkled; mid-ribs and veins often tinged with purple.

Harbinger (Sutton), **A.M.** May 9, 1911.—An excellent early cabbage, producing a good, firm heart; compact and tidy in growth; leaves broad and slightly glaucous.

Imperial (Wheeler).—A strong, compact grower, producing useful medium sized hearts; leaves broad, with a purplish mid-rib.

CABBAGE (1911).

Alpha (Wheeler).—A medium sized cabbage of the 'Little Pixie' type; the outer leaves are large and spreading, and the head of medium size, firm and conical. The variety comes into use early.

Christmas Drumhead (Nutting), **A.M.** December 12, 1893.—A splendid late variety of large size having glaucous leaves and prominent mid-ribs and veins. The head is roundish in shape and very firm and solid.

Daniel's Defiance (Nutting).—A medium sized plant of the 'Enfield Market' type, with rather large outer leaves and a conical head.

Dreadnought (Wheeler).—This variety is of the 'Drumhead' type, with rather large crinkled outer leaves, and a medium sized firm head.

Drumhead (dwarf) (Holmes).—A good selection of this well-known type with spreading glaucous outer leaves and a rounded firm head of large size.

Drumhead (large) (Holmes).—Very similar to the last-mentioned variety, but having rather more crinkled leaves and being a trifle later.

Earliest (Nutting).—A medium sized variety with a small spread of outer leaves and a good useful conical heart; comes into use early.

Earliest (Dobbie).—A useful cabbage of the 'Early Evesham' type; size large, with a good spread of rather large outer leaves of a light green colour; head roundish in shape, of good size, solid and firm, almost white.

Early Evesham (Nutting), A.M. August 25, 1908.—Plant of medium size, moderately compact, with rather large outer leaves; head of medium size; elongated, firm, of fair size; quickly coming into use, and standing well. A good useful variety.

Ellam's Early Dwarf (Nutting), F.C. April 8, 1884.—A good stock of this well-known variety producing plants of medium size with a moderate spread of outer leaves which are medium in size and of a slightly glaucous colour; heads small, but very firm and useful.

Flat Dutch (Nutting).—Plant large with a good spread of large glaucous outer leaves; heads large, flat, and very firm.

Holstein (Holmes).—An example of the 'Drumhead' type, producing large plants with many glaucous outer leaves; heads firm, large and roundish.

Imperial (Wheeler).—A cabbage of the 'Early Evesham' type requiring a little more selection.

John O'Groat (Holmes).—The stock was slightly mixed, and requires a little more selection, but the majority of the plants were large, having a good spread of outer leaves and firm heads, varying in shape from rounded to conical.

Nonpareil Improved (Nutting), A.M. August 25, 1908.—A good cabbage of the 'Little Pixie' type, being medium in size with a small spread of outer leaves and firm bluntly pointed heads.

Pearson Conqueror (Holmes).—A variety of the 'Early Evesham' type of medium size and with little outer foliage. Heads firm and conical.

Reliance (Cattell's) (Nutting).—A variety of the 'Little Pixie' type somewhat similar to 'Nonpareil Improved.'

Winningstadt (Holmes), A.M. September 10, 1895. A good stock of this splendid variety producing large plants with large spreading glaucous outer leaves and very fine conical heads terminating in an acute point.

Winningstadt Improved (Dobbie), A.M. November 20, 1900.—A greatly improved form of this well-known type.

CAULIFLOWER.

Her Majesty (Toogood).—A good medium sized plant of the 'Early London' type. Heads rounded, white, firm and solid.

Knight of Malta (Toogood).—The outer leaves of this variety, which is of the 'Walcheren' type, are large and glaucous. Heads very small, and of little value in the majority of cases.

Masterpiece (Toogood).—This variety is also of the 'Walcheren' type. Heads small, loose, and uneven.

Timely (Toogood).—A splendid cauliflower of the 'Early London' type, with large outer leaves and large rounded heads, which are white and very firm and solid.

KALE (1910-11).

Labrador (Laxton), **A.M.** May 9, 1911.—An excellent variety, producing abundance of useful shoots; very bushy in habit; early and very hardy, having withstood very severe frosts.

MARROW.

Smith's Earliest of All (Smith).—A very vigorous early variety of good flavour, producing an abundance of fine healthy foliage of trailing habit, and many good sized dark green marrows. It is said to be the result of crossing marrow 'Sutton's Long Green' with a slightly bitter variety *Cucurbita Pepo*.

MELON.

1. First (D. Earp).—Medium-sized fruits, varying in weight from 1½-3 lbs., 3 fruits to a plant, oval, green, ridged, not netted; flesh, shallow, greenish, flavourless.

2. Second (D. Earp).—Showed no fruit.

3. Third (D. Earp).—Fruit, large, weighing about 5 lbs., 1 fruit to a plant, long oval, green, slightly ridged, not netted.

4. Fourth (D. Earp).—Fruit, good sized, weighing on an average 4 lbs., 2 fruits to a plant, round, yellow, heavily netted; flesh, deep, white, sweet and melting.

5. Norbury Seedling (G. Kent).—Fruit, medium-sized, weighing 3 lbs., 2 fruits to a plant, oval, green, smooth, slightly netted at the base; flesh, shallow, pale, flavourless.

6. Norbury Hero (G. Kent).—Fruit, medium-sized, weighing from 2-4 lbs., average of 2 fruits to a plant, oval, very heavily netted; flesh, shallow, sweet.

7. Ufford Beauty (Whitmore).—Large fruits, weighing 5-6 lbs., 3 fruits to a plant, round, green, deeply netted; flesh, deep, white, flavourless.

8. Favourite II. (Mitchelson).—Fairly large fruits, weighing about 5 lbs., 3 fruits to a plant, oval, yellow, netted; flesh, deep, white, nice flavour.

9. Hero of Lockinge × Favourite (Le Lacheur and Sherris).—Fruit, small, weighing 1½-3 lbs., 4 fruits to a plant, round, dark green, heavily netted; flesh, pale.

10. Barnett's Marvel (Barnett).—Good sized fruits, weighing from 3-5 lbs., 3 fruits to a plant, oval, lemon-yellow, deeply netted; flesh, fairly deep, white, melting and juicy.

RADISH.

Mottled Empress (Triumph) (R. Veitch).—A fairly vigorous grower having red round roots of medium size tipped with white. It has a nice mild flavour, and turns in quickly.

Olive-shaped Carmine (R. Veitch).—A vigorous and quick grower of medium size with rather long red roots. It has a rather hot taste.

Round Carmine (R. Veitch).—A small red round variety with

white tips. It is a vigorous variety, mild in flavour, and very crisp.

Sparkler (R. Veitch).—A good turnip variety; red in colour with white tip. It is mild in flavour.

Violet Giant (R. Veitch).—A vigorous turnip-rooted variety of a purple colour. It is of a very mild flavour and crisp.

TOMATO.

Barnett's Supreme (Barnett). Fruits of medium size, round, smooth, scarlet, averaging seven fruits to a truss; short-jointed; foliage of medium size, crop good.

Coronation (Mitchelson).—Fruit medium, round, smooth, scarlet, average number of fruits in a truss nine; short-jointed growth; foliage rather coarse; crop heavy.

Hancock's Early Crimson (Hancock).—Fruits large, round, smooth, bright scarlet, averaging eight fruits to the truss; growth short-jointed; foliage medium in size; crop heavy.

Smart's Finality (Platten).—Fruit large, mostly round, smooth, scarlet; average number of fruits to a truss, nine; growth short-jointed; foliage of medium size. An excellent cropper, and a splendid variety for market work.

TURNIP.

Taylor's Cream (Taylor).—A very even-shaped turnip of nice size; round, white; foliage sturdy and short; flesh, white, sweet, rather tough; mid-season.

BOOK REVIEWS.

"The Book of Roses." By Louis Durand. 8vo., 101 pp. (Lane, London, 1911.) 2s. 6d. net.

If evidence were wanted of the increasing popularity of the rose it might be found in the large number of books devoted to its history, cultivation, &c., which have made their appearance in recent years. The difficulty in finding new and appropriate titles for these new volumes has also increased, if we may judge from that given to the one under notice, for we have already a standard work on the same subject entitled "The Book of the Rose." In the present handy little treatise the author has gathered together from various sources, both new and old, a number of facts and opinions on the various phases of rose culture which cannot fail to be read with interest not only by the tyro but also by more experienced cultivators of our national flower. There is one thing for which the beginner should be grateful to the author, and that is, that instead of overwhelming him with a bewildering number of varieties from which to make a selection, he has inserted at the end a short list of well-tried and reliable sorts for him to choose from. Several of the full-page portraits, mostly of exhibition blooms, given at intervals throughout the book, are excellent.

"Wood and Garden." By Gertrude Jekyll. 8vo., 286 pp. 71 illustrations from photographs by the author. Eleventh Impression. Re-issue. (Longmans, London, 1910.) 6s. net.

This is one of those delightful books for which Miss Jekyll is deservedly famous. About one-third of it, the preface informs us, appeared in the *Guardian* during the years 1896 and 1897, as "Notes from Garden and Woodland." We have nothing but praise for the beautiful series of photographs, the greater part of which were made on the fifteen acres of ground comprised in the author's garden or its environment. It testifies to the excellent ideas carried into effect by this gifted lady, and cannot fail to create and stimulate interest in the wood and garden from its best and most inspiring aspect.

In the introductory chapter the love of a garden is fully dealt with, and the reader may gather the character of the book from one paragraph which is well worth repeating. "The love of gardening is a seed that, once sown, never dies, but always grows, and grows to an enduring and ever increasing source of happiness." Miss Jekyll continues in the same chapter: "If in the following chapters I have laid special stress upon gardening for beautiful effect, it is because it is the way of gardening that I love best and know most about, and that seems to me capable of giving the greatest amount of pleasure." This surely is what all those who love a garden are striving after, and the

subsequent chapters have much to tell us of what to do to make the most of the space available.

This book is really the notes and thoughts, practical and critical, of a working amateur, and is the result of nearly thirty years of gardening. The knowledge has been gained by experience, step by step, until, as the author puts it, "Each new step becomes a little surer, and each new grasp a little firmer, till, little by little, comes the power of intelligent combination, the nearest thing we can know to the mighty force of creation."

A chapter is devoted to each month of the year. Thus in January we find the following points considered: "Beauty of Woodland in Winter; The Nut Walk; Thinning the Overgrowth; A Nut Nursery; *Iris stylosa*: Its Culture: Its Home in Algeria: Discovery of the White Variety; Flowers and Branches for Indoor Decoration."

A few items from the April chapter are the following:—"Woodland spring flowers; Daffodils in the Copse; Grape Hyacinths and other spring bulbs: How best to plant them; Flowering Shrubs; sweet scents in April; Auriculas; Tulips; Primroses; Lent Hellebores, &c., &c., &c." Again, in October, "Michaelmas Daisies: Arranging and staking; Spindle-tree; Autumn colour of Azaleas; Quinces; Medlars; Advantage of early planting of shrubs; Hardy flower border; Lifting dahlias; Dividing hardy plants; Plants difficult to divide, &c., &c., &c."

The reader can readily understand from this method of dealing with gardening matters that the work is thoroughly practical, and should be very helpful to the inexperienced amateur who is seeking for information and who desires to carry out each item of seasonable work in proper fashion, and in the hope of beautifying his or her own garden by adopting somewhat similar measures.

If proof of the practical value of this entertaining book were needed, it would be only necessary to quote from a portion of the October calendar which reads, as follows:—"During the year I make careful note of any trees or shrubs that will be wanted, either to come from the nursery or to be transplanted within my own ground, so as to plant them as early as possible. Of the two extremes it is better to plant too early than too late. I would rather plant deciduous trees before the leaves are off than wait till after Christmas, but of all planting times the best is from the middle of October till the end of November, and the same is the best for all hardy plants of large or moderate size."

Valuable and instructive is the chapter devoted to the consideration of "Large and Small Gardens." In this treatise there are considered among others such subjects as "A well-done villa garden; a small town garden; two delightful gardens of small size; a large country house and its garden; terrace lawn; parterre; tree garden; a window garden, &c., &c., &c." The comprehensiveness of the theme convinces the reader that the author has advised or assisted many who have, no doubt, freely sought this famous gardener's advice and assistance for years past.

Everything must have a beginning, and there are those who are really desirous of beginning in proper fashion, but who are somewhat fearful how to proceed. "Beginning and Learning" is a chapter of invaluable advice to the novice. For instance, in this chapter Miss Jekyll tells the reader "There is no royal road. It is no use asking me or any one else how to dig. I mean sitting indoors and asking it. Better go and watch a man digging, and then take a spade and try and do it, and go on trying till it comes, and you gain the knack that is to be learnt with all tools of doubling the power and halving the effort."

Other chapters are devoted to "The Flower Border and Pergola," "The Primrose Garden," "Colours of Flowers," "The Scents of the Garden," "The Worship of False Gods" (this is excellent, and the scathing remarks in many instances are quite justifiable), "Novelty and Variety" (there is much in this with which all lovers of the really beautiful in the garden will be in complete accord), "Weeds and Pests," "The Bedding Fashion and its Influence" (when one looks back on the past methods of dealing with bedding plants it is so easy to be in agreement with what Miss Jekyll calls attention to in this chapter), and "Masters and Men."

This is a gardening book that should be found in the library of all who wish to develop a garden that they can really enjoy, it may also be regarded as a book of reference, and may be taken up in spare moments, as its contents are both entertaining and in many respects most fascinating.

"Home and Garden." By Gertrude Jekyll. New Edition. Third Impression. Svo., 301 pp. (Longmans, London, 1910.) 6s. net.

As the title page so aptly expresses it this is a work embodying "notes and thoughts, practical and critical of a worker in both." Miss Gertrude Jekyll has succeeded in presenting to the reader in a most fascinating manner, notes and reflections chiefly relating to matters pertaining to the garden in association with all that concerns the most charming aspect of the home. No one could read this delightful volume without feeling how much they had missed in their garden in the past, and the suggestions made for planting a garden wherein one could derive real joy and happiness, cannot fail to stimulate the reader to resolve to act upon the many examples so clearly portrayed by charming photographs and the pen of a ready and accomplished writer who gives information and advice with respect thereto. Exceedingly interesting is the chapter dealing with 'How the house was built.' There are many points considered under this heading, that cannot fail to be of great assistance to any who may be contemplating the building of a house in the country. Much thought was evidently bestowed on numerous details that would miss the mind of many persons but which are of infinite value in building a house that is to be a real home. Miss Jekyll appears to be a keen advocate of gardens of one subject or a garden of flowers of varying tones of one colour. She devotes a chapter to "A Garden of Wall-Flowers" and in this chapter is given a

discourse on a number of plants that thrive in difficult circumstances. "Trees and Lanes" are dealt with at very considerable length.

Miss Jekyll waxes enthusiastic when she writes of "Briar Roses," and one cannot help being influenced by her description of what a Briar Rose garden should be like. She says "My Briar Rose garden should have grass paths; whether wide or narrow, straight or winding, could only be determined on the spot, and in relation to all that was near about it." "Midsummer" is the title of another chapter, and the character of this treatise is reflected in the opening remarks which go on to say "The whole garden is singing its hymn of praise and thankfulness." This refers to the following quotation at the head of the chapter, "Thou sentest a gracious rain upon thine inheritance, and refreshest it when it was weary." The references to the various kinds of Iris in this chapter are extremely useful and many of them are dealt with in considerable detail. "Roses and Lilies" quite rightly are given an exalted position. Apart from their value in the garden they have an historic interest and Miss Jekyll fittingly refers to this. A broad view both of the Rose and of the Lily is taken, in consequence of which fact, we find quite a large number of most interesting bulbous plants mentioned in the latter connexion.

"Large Rock-gardens" and "Small Rock-gardens" have each a chapter devoted to their consideration and much helpful advice is given to those about to form one or the other or both. As this method of gardening is increasing in popular esteem, and as it is important that a proper conception of a rock-garden should be held before the making of it is attempted, excellent advice is tendered in the two chapters under notice, over which those who are interested would do well to ponder, before committing themselves to create the monstrosities so frequently met with nowadays. Many readers will appreciate the opening remarks in the chapter on "Small Rock-gardens" which are as follows:—"An artificial rockery is usually a bit of frankly simple make-believe. Nine times out of ten there is something about it half funny, half pathetic, so innocent, so childish is its absolute failure to look like real rocky ground." How true this of many so-called rock-gardens met with in gardens to-day!

"The Workshop" is a most entertaining chapter, and recalls the attachment most of us had and still have for the practical work of those who endeavoured to interest us in mechanical and other work in our earlier years apart from its usefulness to us to-day.

Of the many subjects delightfully dealt with in this useful book the chapter on "Cut Flowers" interests us more than anything else. Not only has Miss Jekyll told us how to arrange flowers artistically, but she has given invaluable advice as to cutting flowers to be sent on a journey, the method of packing, and the way to treat them on their receipt after a long journey. One can only sum this up in proper fashion by saying that thoroughness characterizes everything that is done, and herein lies the secret of success. The author truly says that "cut flowers should never lie about before being put in

water." "Flowers that have a milky juice such as Oriental and other Poppies" &c., want special care. Hardwooded subjects should have the cut end of the flower stem slit up, so as to enable them to take up the water more readily. Plenty of advice of this description is set forth in detail and those who read the directions given, cannot fail to benefit immensely by so doing.

Other chapters on "Conservatories," "The Making of Pot-Pourri," "Plants for poor Soils," "Wild Ferns," "The Kitchen Garden," "Things Worth Doing," and several others are equally interesting and most profitable to the reader, and we cannot conceive a more welcome gift to any friends who love their garden and home and want to make the most of them.

"Studies of Trees and Flowers." By M. Wrigley. With Descriptions by Annie Lorrain Smith, F.L.S. 8vo., 129 pp. (Methuen, London, 1911.) 15s. net.

This is a sumptuous work, the illustrations being excellently reproduced, while the descriptions of each tree, shrub or flower are concise and to the point—just what is required for the purpose of identification.

In all one hundred and twenty-nine illustrations, to each of which a page is devoted, with an equal amount of letterpress, are included in the book.

The price is perhaps prohibitive to the ordinary student of flowers, but the beautifully executed plates, clear type, and tone of the paper will all recommend the work to those who are interested, as the writer says, "in the beautiful and varied treasures of the vegetable kingdom that grow wild or with easy cultivation in our British Islands."

"Vocabulaire Forestier: Français—Allemand—Anglais." Par J. Gerschel. Revu par W. R. Fisher. Cinquième édition considérablement augmentée. 8vo., 192 pp. (Clarendon Press, Oxford, 1911.) 5s. net.

This is the fifth edition of a work useful to everyone who is interested in the science of forestry, and of particular value to the English student, as it explains many terms that are employed abroad, where the tending of woodlands receives more attention, in a commercial way at least, than is the case at home. This handy pocket-book, which extends to some two hundred pages, gives the English, French, and German versions of the various terms used in connexion with the management of woodlands or forestry in its widest sense, and the fact of its having gone into a fifth edition is sufficient proof of its popularity. As before said, it is of special value to the British student who contemplates studying foreign methods of timber culture, and to him we would recommend it for its portable size and the vast amount of information it contains.

"British Trees, including the Finer Shrubs for Garden and Woodland." By the late Rev. C. A. Johns, B.A., F.L.S. Edited by E. T. Cook and W. Dallimore. With 56 full-page plates (24 coloured) and 41 text illustrations. 8vo., 285 pp. (Routledge, London, 1911.) 7s. 6d. net.

This is an interesting book, the history, folk-lore, and quotations from our principal authors on the subject having been pieced together in the story of each tree and shrub. From a purely practical point of view it is not perhaps intended to be useful, though the rate of growth of some of the trees, quality of timber, and other points of interest to the owner of woodlands will be welcome.

We hardly agree with the author when he says that the Willow does not rank high as a picturesque tree, nor that the wood of the Scots and Corsican Pine are similar in quality. Our own experience, from trees grown all over the country, is that the grain of the wood of *Pinus Laricio* is much coarser than that of the Scots Pine.

The Douglas Fir for economic planting is overrated, for in this country it is mainly suitable for rich deep valleys like the cañons of its native country.

There is much useful information given about the Oak, and the quotations from Gilpin, Evelyn, Loudon, and others regarding the tree are of value as being accessible under one heading.

The work, which extends to nearly three hundred pages, is illustrated by about one hundred plates, the uncoloured ones especially being remarkably true to nature and well reproduced.

"Some English Gardens." After drawings by George S. Elgood, R.I. With Notes by Gertrude Jekyll. New Edition. 4to., 131 pp. (Longmans, London, New York, and Bombay, 1910.) £2 2s. net.

In size and get-up generally "Some English Gardens" is uniform with another work from the same publisher entitled "Italian Gardens." In both cases Mr. George S. Elgood is the artist from whose water-colour drawings the reproductions are made, and in the majority of cases they may be considered to be as satisfactory as modern colour-process work can be expected to make them. These illustrations are all full-paged and *hors texte*, and inclusive of the frontispiece number fifty in all. They are certainly tasteful and attractive little bits of garden pictorial art, and it would be somewhat of an invidious task to decide which are the best, for in these matters so much must necessarily depend upon individual taste.

The volume is a credit to printer, author, and publisher alike. It is neatly bound in dark-blue cloth and gilt lettered. The typographical work is executed in excellent style, and the book-lover will warmly welcome the very liberal margin that surrounds the text.

We turn over the leaves with feelings of undisguised pleasure as we gaze upon the numerous attractive plates that embellish the work. While fully appreciating some of the calmer, cooler-looking views where clipped trees, hedges and other greenery appear, such as the Terrace,

Brockenhurst; the Yew Alley, Rockingham; Melbourne; Condoover, the Terrace Steps; Levens; the Yew Walk, Crathes, &c., we must confess that many of those depicting the glowing glories of some of the famous flower-gardens, with their deeper, richer tones, appeal to us with far greater effect.

Peculiarly interesting and attractive are such beautiful bits of garden colour as the Pergola, Great Tangley; the Alcove, Arley; Michaelmas Daisies, Munstead Wood; Compton Wynyates; the Deanery Garden, Rochester; Brickwall, Northiam; the Terrace steps, Penshurst; and several others of a like character.

The descriptive text is devoted to some well-known English gardens, although in spite of the title we notice some Scotch and Irish ones are also represented. Selecting a few at haphazard we may mention that the authors discourse upon the horticultural beauties of such places as Brockenhurst, Great Tangley Manor, Biamham, Melbourne, Berkeley Castle, Abbey Leix, Palmerstown, Hardwick, Montacute, Levens, Speke Hall, Penshurst, &c. Here and there by way of agreeable variation are given some details of historic interest concerning the houses to which these gardens are attached. Sometimes the notes are amplified by remarks concerning the capabilities of some of the occupants of the gardens, but in each and every case we are afforded a readable and instructive account of the horticultural features of the place under consideration.

"Some English Gardens" is a handsome book, and with its companion volume, "Italian Gardens," will form an interesting addition to the library of many a lover of artistic garden books.

"Orchids for Amateurs." By C. Alwyn Harrison. Edited by T. W. Sanders. 8vo., 148 pp. (Collingridge, London, 1911.) 2s. 6d. net.

This little book is advanced as a practical guide to the cultivation of sixty easily-grown and fifty warm-house orchids adapted for small mixed greenhouses, and in its pages the author, himself a small amateur operating on a very restricted scale, endeavours to give his experience of the requirements of the plants dealt with for the benefit of others who have but little accommodation for orchid growing. If, as the author suggests, the publication of the book should arouse a desire in its readers to embark in orchid growing, the author's wish, and a generally beneficial result to the interests of orchid growing, will have been attained. Like all others who undertake a work on such a large subject as orchids, the author must have felt some difficulty in what to select and what to exclude. He has, however, been happy in his selection, although there are inevitably a very large number of species equally suitable for the purpose. For a work intended for beginners only, the descriptive and general remarks about the orchids enumerated appear to be unduly in excess of the more important cultural directions, and, in some cases, inaccurate. For example, in the introduction the author states:

"Some plants, like *Grammatophyllum speciosum*, produce bulbous stems over 30 feet in height," which will be a new record, and the term "bulbous" is commonly used for pseudo-bulbous. The chapter, however, which is more likely to bring about disaster than success is that at pp. 60 and 61, headed "Feeding," in which extensive use of most potent manures is directed, without any guide to the strength or the quantity of the manure to be used, the only caution given being that the manure must not be used except when the plant is in full growth and in bud and flower. Such passages as the following are examples:—

"Guano should be given twice a week, in a liquid form, and Clay's Fertiliser and Canary Guano are the most satisfactory kinds to use."

"To prevent *Oncidiums* from deteriorating, feeding, supplemented by annual re-panning, is of absolute necessity. Guano should be given three times a week during the growing season and when in flower. Add a teaspoonful of the dry Guano also to the compost of *Oncidium macranthum*, and *O. Marshallianum*. If few and repanned annually, this deterioration will be effectually checked."

A liberal interpretation of these and other instructions would bring about failure.

The book is excellently printed and embellished with twenty illustrations of popular orchids, and much useful information, especially adapted for the small amateur, is to be found in its pages.

"Plant-Life on Land, considered in some of its Biological Aspects." By F. O. Bower, Sc.D., F.R.S. 8vo., 172 pp. (University Press, Cambridge, 1911.) 1s. net.

"The Evolution of Plants." By Dr. D. H. Scott, M.A., F.R.S. 8vo., 256 pp. (Williams and Norgate, London, 1911.) 1s. net.

"Plant Life. A Text-book of Botany for Schools and Colleges." By Eug. Warming. 8vo., 244 pp. (Allen, London, 1911.) 4s. 6d. net.

"Practical Plant Physiology." By F. Keeble, Sc.D. and M. C. Rayner, B.Sc. 8vo., 250 pp. (Bell, London, 1911.) 3s. 6d.

"British Plants, their Biology and Ecology." By J. F. Bevis, B.Sc., and H. J. Jeffery, F.L.S. 8vo., 334 pp. (Rivers, London, 1911.) 4s. 6d. net.

These books show more or less the tendency of writers to superadd to morphology, phenomena of plant life in connexion with structure, i.e. the new aspect of botany called Ecology.

Dr. Bower in his little book deals first with present-day botany. Then he treats of the beach and rocks with their vegetation; with the structure and habits of the bracken fern. This is followed by the flower and its metamorphosis, in which he alludes to the "flowers" of the old geological times. Plant population, sand dunes, and golf links are considered. As far as they go these somewhat disjointed chapters are interesting.

The second, by Dr. Scott, looks at the evolution of plants from the geological point of view. This little book is a condensed account from his two volumes on fossil plants, showing—as far as it is possible—the probable line of evolution from cryptogams to flowering plants.

Professor Warming's book is pure morphology, with descriptions of plant associations at the end. It has excellent illustrations. Though this botanist has shown that adaptations are the direct result of response to external conditions (in his *Lagoa Santa* and *Oecology*), it would have been a valuable addition to have stated this as the cause of the morphological structures he describes.

"Practical Plant Physiology" is an excellent manual full of experiments easy to be made, and takes each organ, root, stem, leaves, &c., in order. The authors, we are glad to see, urge that it is by the response of plants to stimulations that structures arise. This is the true basis of evolution. Thus they write:—"Under the influence of changed external conditions, the course of development of the organs may undergo such modifications as fit them the better to carry on their work in the new conditions." The process of evolution could not be better or more accurately expressed.

"British Plants." This is an attempt to give some account of our flora on ecological lines, first dealing with the environment and its influence upon vegetation, discussing water-plants, tropophytes, the effects of light, heat, air, soil, &c. Then follows the classification of plants according to their habits, as epiphytes, climbers, &c. Speaking of external protective equipments, as prickles, &c., the authors attribute them to natural selection; but as spinescence generally is only a result of drought, there is no need to call in Darwin's theory. Though recognizing self-fertilization as frequent and injurious, the devices are not for the *prevention* of self- but for securing cross-pollination, when self-pollination, for the time, is ousted. The only explanation of adaptation given is Darwinism and De Vries' Mutation; but what ecologists now *know* is that they are the result of response of the individual itself to changed conditions of life, as stated in the above work on "Practical Plant Physiology." In describing sub-floras of England, the S. European types seen in Normandy, the Channel Islands, and the South-West of England are omitted. On the whole it is an interesting book, and ought to be a very useful volume.

"The Life of Sir Joseph Banks, President of the Royal Society, with some notices of his friends and contemporaries." By Edward Smith, F.R.H.S., with a photogravure frontispiece and sixteen other illustrations. 8vo., 348 pp. (Lane, London, 1911.) 12s. 6d. net.

Sir Joseph Banks was born in 1743, and died in 1820. The appearance of this valuable book ninety-one years after his decease is accounted for by the fact that no account of this great man's personality had appeared. "A detailed life of this worthy man has always been wanted." A great traveller and scientist, a worthy squire and landlord, who took the deepest interest in horticulture and

agriculture, especially in the improvement of the Merino sheep in Lincolnshire, he was for many years the President of the Royal Society, and always a generous helper of all eminent societies as well as individuals.

The author takes us round the world with Banks and Cook. Being a wealthy man, no expense was spared in securing the aid of good collectors and artists; so that the botanical and other treasures were great and valuable.

He next takes us to Iceland, and describes Cook's second and third journey; while the unfortunate mutiny of the *Bounty* finds a place.

Banks was elected President of the Royal Society in 1778, and although he was a most worthy and zealous patron of science, some did not like his masterful manner. He determined to restore the older restrictions as to candidature for membership. "He would have the Royal Society so far exclusive as to forbid the admission of such gentlemen who seemed to regard the distinction mainly as a step in personal advancement." There were consequently eleven rejections in the first five years. A certain number wished to reject him, but when put to the vote, 119 were "Ayes" for him, and forty-two "Noes"!

Banks came in contact with George III. by his great interest in Kew Gardens. He paid much attention to, and provided for collectors of exotic plants, and had an enormous correspondence. "Before many years passed there was scarcely any part of the world where there was not some one or other in touch with Banks." He had a wonderful way of kindling enthusiasm in others for botanical service.

An interesting chapter is devoted to "Plant Collectors, &c." Of those we read of Corneille, an officer of the E.I.C.; Dr. König, of Livonia; Dr. W. Roxburg, of Indian fame; Dr. Melville, Governor of Grenada, Dominica, &c.; and others. In 1809 Mr. W. J. Hooker made a botanical tour in Iceland, taking a kindly message from Banks to Olaf Stephensen, an old Icelandic friend of Banks. Unluckily Hooker lost all his plants in a fire on his way home. Banks supplied him with his own memoranda for Hooker's "Tour in Iceland."

"The Founding of Australia" has a chapter; some account of this has already been published by Mr. J. H. Maiden's "Banks, the Father of Australia."

Space will not allow more, but the above will show anyone keenly interested in this wonderful man that the book will be profoundly interesting from beginning to end.

"How to Cook Vegetables." By C. Herman Senn. 8vo., 220 pp. (The Food Publishing Agency, London, 1911.) 2s. net.

How many a time and oft has a good gardener cause to complain that the kitchen does not know how to deal properly with the vegetables with which he daily supplies it! Some cooks and some housekeepers seem to have no single idea with regard to vegetables save that they should be boiled and served *with* meat!

In the book before us, Mr. Senn most successfully demolishes the last-mentioned delusion by giving us nearly 500 different ways of cooking the twenty-eight different vegetables with which he deals. And as regards the first point we have mentioned, Mr. Senn is such a well-known authority, and of such unique position, that there is not a chef in the world but would be glad to take hints at his hands—indeed, it can only be ignorant cooks who think they have no need of Mr. Senn's teaching.

Here, then, is a book from the highest authority and of unbounded utility. It ought to be in the hands of every good cook, and of every good housekeeper, too, from John o' Groat's to Land's End and from Land's End to Thanet. The wider the circulation that gardeners can secure for this book the better appreciation will they obtain for the vegetables they send in to the kitchen; and the more cooks study it, the greater the credit they will earn for their skill.

“Profitable Bee Keeping.” By H. Geary. 8vo., 124 pp. (Pearson, London, 1911.) 1s. net.

This little book, written by a practical bee-keeper and expert to the Leicester Bee-keepers' Association, forms a very clear and concise guide to that useful adjunct of the fruit garden and that source of profitable pleasure—bee-keeping. It is written in such a lucid manner, and so well illustrated, that the veriest tyro will find in it such instruction as will enable him to succeed if he but follow it faithfully.

“Lessons on Soil.” By Dr. E. J. Russell. 8vo., pp. xv. + 132. (University Press, Cambridge, 1911.) 1s. 6d.

The author has tried these lessons on that severe, if not always articulate critic, the schoolboy in the village school.

They are not only reliable—the author's name is guarantee enough for that—but they are instructive as well, and teachers will find them full of suggestion. Where school gardening forms part of the curriculum these lessons, in the hands of the wise teacher, will prove invaluable aids to a better appreciation of the soil with which the children are so intimately in contact.

NOTES ON RECENT RESEARCH
AND
SHORT ABSTRACTS FROM CURRENT PERIODICAL
LITERATURE, BRITISH AND FOREIGN,
AFFECTING
HORTICULTURE & HORTICULTURAL SCIENCE.

JUDGING by the number of appreciative letters received, the endeavour commenced in volume xxvi. to enlarge the usefulness of the Society's Journal, by giving an abstract of current Horticultural periodical literature, has met with success. It has certainly entailed vastly more labour than was anticipated, and should therefore make the Fellows' thanks to those who have helped in the work all the more hearty.

There are still, we feel, some departments of Horticulture and Horticultural Science very imperfectly represented in these abstracts, and the Editor would be grateful if any who have time at command, and who are willing to help in any special direction in this work, would communicate with him. He desires to express his most grateful thanks to all who co-operate in the work, and he ventures to express the hope that they will all strictly adhere to the general order and scheme of working, as the observance of an identical *order* can alone enable the Editor to continue to cope with the work. The order agreed on is as follows :—

1. To place first the name of the plant, disease, pest, &c., being noticed ; and in this, the prominent governing or index word should always have precedence.

2. To place next the name, when given, of the author of the original article.

3. Then, the abbreviated form of the name of the journal, &c., in which the original article appears, taking care to use the abbreviation which will be found on pp. 281, 282.

4. After this, a reference to the number, date, and page of the journal in question.

5. If an illustration be given, to note the fact next, as "fig.," "tab.," or "plate."

6. After these preliminary necessities for making reference to the original possible for the reader, the abstract or digest should follow, ending up with the initials of the contributor affixed at the close of each Abstract or Note.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP
IN THIS WORK.

Baker, F. J., A.R.C.S., F.R.H.S.
 Ballard, E., F.R.H.S.
 Beer, R., B.Sc., F.L.S., F.R.H.S.
 Boulger, Professor G. S., F.L.S., F.R.H.S.
 Bowles, E. A., M.A., F.L.S., F.E.S., F.R.H.S.
 Bunyard, E. A., F.R.H.S.
 Cayley, D. M.
 Chapman, H., F.R.H.S.
 Chittenden, F. J., F.L.S., F.R.H.S.
 Cooke, M. C., M.A., LL.D., A.L.S., F.R.H.S., V.M.H.
 Cotton, A. D., F.L.S.
 Darlington, H. R., F.R.H.S.
 Druery, C. T., V.M.H., F.L.S., F.R.H.S.
 Dykes, W. R., M.A., F.R.H.S.
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 Groom, Professor Percy, M.A., D.Sc., F.L.S., F.R.H.S.
 Hartog, Professor Marcus, D.Sc., M.A., F.L.S., F.R.H.S.
 Henslow, Rev. Professor Geo., M.A., F.L.S., F.R.H.S., V.M.H.
 Hodgson, M. L., F.R.H.S.
 Hooper, Cecil H., M.R.A.C., F.R.H.S.
 Horne, A. S., B.Sc., F.G.S., F.R.H.S.
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 Jeffery, Violet G., F.R.H.S.
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 Massee, Geo., F.L.S., F.R.H.S., V.M.H.
 Newstead, R., A.L.S., F.E.S., F.R.H.S.
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 Petts, Alger, F.R.H.S.
 Rendle, A. B., M.A., D.Sc., F.L.S., F.R.S., F.R.H.S.
 Reuthe, G., F.R.H.S.
 Scott-Elliot, G. F., M.A., B.Sc., F.L.S., F.R.H.S. F.R.G.S.
 Smith, William G., B.Sc., Ph.D., F.R.H.S.
 Swire, W., F.R.H.S.
 Veitch, Harry J., F.L.S., F.Z.S., F.R.H.S.
 Voss, W. A., F.C.S., F.R.H.S.
 Webster, A. D., F.R.H.S.
 Welby, F. A., F.R.H.S.
 Williams, S. E., F.R.H.S.
 Wilson, Gurney, F.L.S., F.R.H.S.

JOURNALS, BULLETINS, AND REPORTS

from which Abstracts are made, with the abbreviations used
for their titles.

Journals, &c.	Abbreviated title.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
Annales Agronomiques	Ann. Ag.
Annales de la Soc. d'Hort. et d'Hist. Naturelle de l'Hérault	Ann. Soc. Hé.
Annales de la Soc. Nantaise des Amis de l'Hort.	Ann. Soc. Nant. des Amis Hort.
Annales des Sciences Naturelles	Ann. Sc. Nat.
Annales du Jard. Bot. de Buitenzorg	Ann. Jard. Bot. Buit.
Annals of Botany	Ann. Bot.
Beih. zum Botanischen Centralblatt	Beih. Bot. Cent.
Boletim da Real Sociedade Nacional de Horticulura	Bol. R. Soc. Nac. Hort.
Boletim da Sociedade Broteriana	Bol. Soc. Brot.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Bulletin de la Société Botanique de France	Bull. Soc. Bot. Fr.
Bulletin de la Soc. Hort. de Loiret	Bull. Soc. Hort. Loiret.
Bulletin de la Soc. Mycologique de France	Bull. Soc. Myc. Fr.
Bulletin Department of Agricult. Brisbane	Bull. Dep. Agr. Bris.
Bulletin Department of Agricult. Melbourne	Bull. Dep. Agr. Melb.
Bulletin of the Botanical Department, Jamaica	Bull. Bot. Dep. Jam.
Bulletin of Bot. Dep. Trinidad	Bull. Bot. Dep. Trin.
Buletino della R. Società Toscana d'Orticulura	Bull. R. Soc. Tosc. Ort.
Canadian Reports, Guelph and Ontario Stations	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chronique Orchidéenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Contributions from U.S.A. Herbarium	Contr. fr. U.S.A. Herb.
Department of Agriculture, Victoria	Dep. Agr. Vict.
Department of Agriculture Reports, New Zealand	Dep. Agr. N.Z.
Dictionnaire Iconographique des Orchidées	Dict. Icon. Orch.
Die Gartenwelt	Die Gart.
Engler's Botanische Jahrbücher	Eng. Bot. Jah.
Gardeners' Chronicle	Gard. Chron.
Gardeners' Magazine	Gard. Mag.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agricult. Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies	Jour. Imp. Dep. Agr. W.I.
Journal of Agricultural Science	Jour. Agr. Sci.
Journal of Botany	Jour. Bot.
Journal of Chemical Society	Jour. Chem. Soc.
Journal of Economic Biology	Jour. Econ. Biol.
Journal of Economic Entomology	Jour. Econ. Entom.
Journal of Genetics	Jour. Gen.
Journal of Horticulture	Jour. Hort.
Journal of the Board of Agriculture	Jour. Bd. Agr.
Journal of the Linnean Society	Jour. Linn. Soc.
Journal of the Royal Agricultural Society	Jour. R.A.S.
Journal S.E. Agricultural College, Wye	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte	Kais. Ges.
La Pomologie Française	Pom. Franç.
Le Jardin	Le Jard.
Lebensgeschichte der Blütenpflanzen Mitteleuropas	Lebens. d. Blütenpf.
Mendel Journal	Mendel Jour.
Naturwiss. Zeitschrift Land und Forst	Nat. Zeit. Land-Forst.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin	Not. Königl. Bot. Berlin.
Oesterreichische Garten-Zeitung	Oester. Gart. Zeit.

Journals, &c.	Abbreviated title.
Orchid Review	Orch. Rev.
Orchis	Orchis.
Phytopathology	Phytopathology.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Quarterly Journal of Forestry	Quart. Jour. of Forestry.
Queensland Agricultural Journal	Qu. Agr. Journ.
Reports of the Missouri Botanical Garden	Rep. Miss. Bot. Gard.
Revue de l'Horticulture Belge	Rev. Hort. Belge.
Revue générale de Botanique	Rev. gén. Bot.
Revue Horticole	Rev. Hort.
The Garden	Garden.
Transactions Bot. Soc. Edinburgh	Trans. Bot. Soc. Edin.
Transactions of the British Mycological Soc.	Trans. Brit. Myc. Soc.
Transactions of the Massachusetts Hort. Soc.	Trans. Mass. Hort. Soc.
Transactions Royal Scot. Arboricultural Soc.	Trans. Roy. Scott. Arbor. Soc.
U.S.A. Department of Agriculture, Bulletins	U.S.A. Dep. Agr.*
U.S.A. Experimental Station Reports	U.S.A. Exp. Stn.†
U.S.A. Horticultural Societies' publications	U.S.A. Hort. Soc.‡
U.S.A. State Boards of Agriculture and Horticulture	U.S.A. St. Bd.‡
Woburn Experiment Farm Report	Woburn.

* The divisions in which the U.S.A. Government publish' Bulletins will be added when necessary.
The name of the Station or State will in each case be added in full or in its abbreviated form.

NOTES AND ABSTRACTS.

Acalyphas, New Hybrid. By H. A. Sandhack (*Rev. Hort.* April 16, 1911; pp. 175-177; 3 illustrations).—Description of several hybrids produced between the offspring of *A. Sanderiana* (*hispida*) and *A. Godseffiana* and other species of the genus with decorative foliage. *A. Camphanseniana compacta*, leaves margined bright yellow and sometimes spotted therewith, flowers mignonette coloured. *A. Ravenae*, flowers greenish white. *A. Dorotheae*, flowers of a striking green colour. *A. Kalbreyerae*, flowers fine yellow. *A. Werneriana*, very long inflorescence, warm rose colour. *A. Ledicniana* bears only male flowers in long strings.—*C. T. D.*

Afforestation in Scotland. By Lord Lovat and Captain Stirling of Keir (*Trans. Roy. Scott. Arbor. Soc.* vol. xxv. pp. 91, 3 maps, 1 plate; 1911).—The value of this important contribution is that it deals with all the details incidental to the afforestation of a special area (Glen Mor). It is a serious attempt to grapple with economic difficulties in afforestation, and although these difficulties are those met with in a Highland area, their exhaustive treatment cannot but be helpful in carrying on those preliminary surveys so necessary before undertaking large schemes of afforestation. The contents of the work are quoted here as they indicate briefly the topics discussed. Chapter I., General: a central forest authority, its first duty; method of procedure; survey of Glen Mor (the maps show the suggested scheme on a large scale). Chapter II., Local economics; wintering; rates. Chapter III., Detailed survey of Fort Augustus block, treatment of sheep farms and deer forests, wintering of sheep and deer in plantations, shootings on moor and low ground. Chapter IV., Rent and other charges: rent and rates. Chapter V., Workmen's dwellings and tenure of holdings: amount of employment; labour supply, houses and tenure of land, offices and buildings, &c. Chapter VI., Control and management: the scheme, foresters, organization. Chapter VII., Finance and employment: expenditure, realization of timber, table of work, wages. Chapter VIII., Stocking of the ground. Chapter IX., Sketch of working plan. Chapter X., Utilization of existing woodland produce. Chapter XI., Conclusion.—*W. G. S.*

Alfalfa Leaf-Weevil, The. By E. G. Titus (*U.S.A. Exp. Stn., Utah, Bull.* 110; Sept. 1910; 2 maps, 1 chart, 14 plates).—This weevil belongs to a group that feed upon leguminous plants. Several species have been introduced into the United States and Canada from Europe. It is a small brown beetle 3-16th of an inch long. The eggs are laid during spring and early summer in the stems and on leaves and buds.

The larvæ are small legless green maggots, which have the habit of feeding and resting in a curled-up position. When full-fed they enter the ground and spin a cocoon. In about fourteen days they emerge as full-grown weevils, which feed on the alfalfa, and hibernate during winter.

It is recommended that the alfalfa be disced in early spring to stimulate the growth, that the first growth be cut when most of the eggs have been laid (middle of May), and then the fields brush-dragged thoroughly.

Sheep may be pastured at this time for two weeks, and after well watering the alfalfa, a good crop will usually be assured. Alfalfa should not be laid down for more than seven or eight years in infested districts.—V. G. J.

American Red Oaks and Copper Beeches. By Schiller Tietz (*Oester. Gart. Zeit.* vol. vi. pt. 1, pp. 30-33).—The Red Oaks *Quercus rubra* and *Qu. coccinea* owe their names to the striking colour of their autumnal foliage. They grow more rapidly than the European oaks and are less fastidious as regards soil and situation. They form a beautiful feature in the landscape. The swamp oak *Qu. palustris* forms a straight slender trunk. In the young trees the branches stand out at right angles but they droop as the trees grow older. The wood is soft, and this probably accounts for the growth of mistletoe on this species.

S. E. W.

Ammonia, Absorption for Atmosphere. By A. D. Hall and N. H. J. Miller (*Jour. Agr. Sci.* iv. pt. 1, pp. 56-68).—A number of experiments by which it was sought to ascertain whether ammonia was lost or gained to the soil by way of the atmosphere are detailed. The experiments are not quite conclusive, however, and it would appear that for some time after applying ammoniacal manures, ammonia is given off into the air from the soil. It is shown that in any event the amount of ammonia absorbed by the soil from the air is extremely small, and is negligible in estimating gains and losses of nitrogen by the soil.—F. J. C.

Angraecum Sanderianum. By O. N. Witt (*Orchis*, vol. iv. pt. 4, pp. 120-123; 1 plate).—This orchid is shown in a photograph. It bears white, sweet-scented flowers, opening in September, which last six weeks.—S. E. W.

Anguloa Ruckeri Lindl. var. By F. Ledien (*Orchis*, vol. iv. pt. 4, pp. 119-120; coloured plate).—This orchid resembles *A. Ruckeri* var. *sanguinea*, described in the *Bot. Mag.* 1863, A. 5384, but is much more beautiful, as the accompanying plate shows.—S. E. W.

Antirrhinums, New. By Ph. de Vilmorin (*Rev. Hort.* March 16; pp. 131-134; col. plate).—A reference to a giant form cultivated in the Upsala Botanic Gardens, which reaches a height of 3 metres = 10 feet,

with flowers deep red without a trace of yellow. The plate represents three very handsome large flowered forms, described as new but unnamed. The article is very interesting as dealing with the history of the flower, its division into sections, large, intermediate and dwarf, which differences, however, it appears impossible to entirely fix. It also deals with Miss Wheldale's experiments to determine the principles which underlie the coloration.—C. T. D.

Apple and Pear, Black Spot of. By D. McAlpine (*Jour. Agr. Vict.* March 1911, pp. 184-190).—A 200-acre orchard chiefly of Yates apple was first sprayed when the flower stalks were visible. The formula used was 6 lb. bluestone, 4 lb. fresh quick-lime, and forty gallons water; the second spraying was given when the apples were formed, at the rate of 6.4.60; the result was that the leaves were beautifully clean and healthy and the fruit shapely and without "spot." A 'Williams' Bon Chrétien' pear tree was sprayed when the pears were at the same stage as in the apple, and the formula used was 6.4.40; the second spraying was given ten days later with 6.4.70; there was no spot observable on leaf or fruit even after the most careful examination.—C. H. H.

Apple and Pear Membracids, The. By H. E. Hodgkins (*U.S.A. Exp. Stn., New York, Tech. Bull.* 17; Dec. 1910; 8 plates, bibliography).—*Ceresa taurina* Fitch. and *C. borealis* Fairm. oviposit between the bud scales of the apple; but this seems to have no detrimental influence on the development of the buds. *C. bubalus* oviposits in the bark of the young wood and is the most destructive membracid or tree-hopper. Apple and pear trees which are attacked by it are often stunted in growth and the branches weakened by continual scarification. These injuries are often aggravated by destructive fungi and insects which find lodgment in the wounds.

Clean cultivation by destroying the host plants of the nymphs is the most practical and efficient remedy for the prevention of injury by the tree-hoppers.—V. G. J.

Apple 'Anise.' By F. Turetschek (*Oester. Gart. Zeit.* vol. vi. pt. 2, pp. 55-56; 1 fig.).—This apple is largely cultivated on the Elbe. It bears fruit of medium size, ripe in October, which will keep till April. The fruit is juicy and aromatic. The tree only succeeds in a sheltered position.—S. E. W.

Apple Growers, Suggestions for Rhode Island. By A. E. Stone (*U.S.A. St. Bd. Rhode Island, Abs. from Report*, 1909; 21 plates; 22 figs.).—This deals with the whole subject from the selection of the site to the marketing of the fruit. It is well-known that individual trees of the same variety vary greatly in their productivity and other important points, and emphasis is laid upon the value of procuring trees which have been raised from scions selected from trees

possessing the maximum of desirable characteristics (p. 109). See abstract under "Apple Culture" in the R.H.S. xxxvi. (1911), p. 761.

A. P.

Apple, Ornamental (*Pyrus floribunda purpurea*) (*Rev. Hort.* Dec. 1, 1910; pp. 539).—By the description a very handsome floriferous apple, raised by M. N. Barbier, of Orleans (*Pyrus floribunda atrosanguinea* × *Pyrus Niedzwetzkiiana*). Foliage purple when young and dark bronze when mature; large, single flowers, crimson or bright cherry red and abundant. The wood rose tinted. Fruits in clusters of 2 to 5 very ornamental, same colour as *Prunus Pissardii*, i.e. deep blood red, changing to scarlet. Habit vigorous, very floriferous and early flowering. Recommended strongly for forcing.—C. T. D.

Apple, Water-core of. By J. B. S. Norton (*Phytopathology*, 1-4, pp. 126-128; Aug. 1911).—The affection here referred to appears to be the same as that known as "glassiness" in this country. The author believes the trouble is due to the water being forced into the intercellular spaces owing to excess of sap pressure. No direct experimental evidence is brought to support the suggestion, which appears, however, to be a probable one.—F. J. C.

Apples, loss of weight in keeping. By M. A. Truelle (*Jour. Soc. Nat. Hort. Fr.* series iv. vol. xi., Dec. 1910, p. 849).—Tables are given showing the progressive loss of weight undergone by stored apples between Oct. 22 and Jan. 28. The experiments were tried on twenty-three well-known varieties of apple, twenty of each kind being selected, all as far as possible of the same medium size and weight. The loss per kilo. is here shown in parallel columns giving the comparative shrinkage in weight, total loss from decay and the estimated money loss on each kilo. which thus disappears. The object is to show the precise moment at which it would be most advantageous to sell the crop of each variety mentioned, setting the enhanced price realized later against the shrinkage of marketable supply.—M. L. H.

Apples, Summer, in the Middle Atlantic States. By H. P. Gould (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 194, Feb. 1911; 4 plates, 7 figs.).—This bulletin discusses the merits and principal characteristics of about forty early varieties suitable for growing in these States (pp. 23-49), and contains a table of phenological records of the most important varieties of all seasons as made by observers in various parts (pp. 57-87). Climatological tables are also given for six years (pp. 13-16) which, studied in conjunction with the records of flowering, gathering, season, &c., form a valuable guide to intending planters in this region.—A. P.

Apricot and Myrobalan (*Prunus cerasifera*) Crossed (*Pom. Franç.* 1911, No. 7, p. 219).—This cross was made by M. Ohlhorn, and provides a useful stock for the apricot. The hybrid has flowered

but no fruit was set. Of somewhat dwarf nature the branches resemble the apricot, but the flowers and leaves are not described. (See also under Peach). (Quoted from *Pomologie Allemand.*)—*E. A. Bd.*

Aquilegia flabellata* var. *nivea (*Bot. Mag.* tab. 8354.)—Japan and Sakhalin. Nat. ord. *Ranunculaceae*; tribe *Helleboreae*. Herb, stem, solitary, 6-10 inches high, 3-flowered; leaves, long-petioled ternately decomposed; leaflets orbicular; flowers, with spurs $1\frac{1}{2}$ inch long, $1\frac{1}{4}$ inch across, greenish-white.—*G. H.*

Aster Falconeri (*Bot. Mag.* tab. 8355).—North-western Himalaya. Nat. ord. *Compositae*; tribe *Asteroideae*. Herb, rootstock perennial; stem $1\frac{1}{2}$ foot high; leaves many oblong-lanceolate, 6-8 inches long; flower-head $3\frac{1}{2}$ inches across; ray-florets many, bluish; disc-florets orange.—*G. H.*

Aster tartaricus* var. *Petersianus. By P. Graebner (*Gartenflora*, vol. lx. pt. 10, pp. 218-219; coloured plate).—This new aster from China flowers in October bearing pale-blue blooms: the cut flowers may be kept in water for several weeks.—*S. E. W.*

Bean, Indigenous in Algeria. By Dr. Trabut (*Jour. Soc. Hort. Fr.* series iv. vol. xi. Nov. 1910, p. 658).—Modern botanists appear to consider that the original parents of our garden bean came from the Steppes to the south of the Caspian Sea. Dr. Trabut and M. Bataandier discovered in the region of Serson, in Algeria, some small seeds of a dwarf-growing species of bean. These seeds were cultivated at the botanical station in Algiers, and the plant has been given the name of *Faba vulgaris Pliniana*, as it is considered likely, though not conclusively proved, that it was the bean described by Pliny. In any case it is declared to be a native species in Algeria, and to bear most affinity to *Faba celtica nana* found by Heer among the débris of the Swiss lake dwellings. The Arabs and Berbers of the coast have various native names for this plant which point to a knowledge of it dating back to a remote period.—*M. L. H.*

Begonia Tuber Disease. By K. Schechner (*Oester. Gart. Zeit.* vol. vi. pt. 5, pp. 161-167; 4 figs.).—The formation of galls on the roots of the *Begonia* is due to the Nematode, *Heterodera radiculicola*. In the open ground the best remedy is to bore holes, inject carbon bisulphide, and close the mouth of the hole. In hot houses the soil can be sterilized by forcing steam under pressure through perforated tubes into it.—*S. E. W.*

Birds of California in Relation to the Fruit Industry, Part II. By F. E. L. Beal (*U.S.A. Dep. Agr., Biol. Survey, Bull.* 34, Aug. 1910; 6 coloured plates).—This deals with the food habits of 32 species, in addition to the 38 species discussed in the first part of the report published in 1907. A large part of the bulletin consists

of statements concerning the food actually found in the stomachs of the birds. It is maintained that few birds are always and everywhere so seriously destructive that their extermination can be urged on sound economical principles (p. 8), and that, except in a few cases, any farmer who is willing to pay the toll collected by birds for actual services rendered will be vastly benefited.—A. P.

Bordeaux Mixture, Action of Carbon Dioxide on. By C. T. Gimmingham (*Jour. Agr. Sci.* vol. iv. pt. 1; May 1911).—Pickering showed that the action of carbon dioxide on ordinary Bordeaux mixture is to render some of the copper soluble so soon as the excess of lime (if any) has been converted into carbonate. The experiments detailed in the present paper lead the author to conclude that it is impossible to attribute the fungicidal action of Bordeaux mixture to the copper sulphate liberated by atmospheric carbon dioxide, for it is shown that it is extremely unlikely for there to be more than the very slightest trace of copper rendered soluble in this way. It is thought that actual contact between the fungus and the particles of insoluble copper compound is the most important means by which germination or further growth of fungus spores is prevented.—F. J. C.

Bulbophyllum lepidum. By J. J. Smith (*Orchis*, vol. v. pt. 4, pp. 52-54; 1 plate).—This orchid is described by Winkler in his 'Orchids of Java.' A coloured plate illustrates its growth.—S. E. W.

Caladiums, Culture of Brazilian. By Numa Schneider (*Rev. Hort.*, July 16, 1911, p. 332-4).—A long and very interesting article on general cultivation, propagation, &c., a very porous soil with an admixture of crushed oyster shells being recommended. Frequent watering rots the fleshy roots. Flowers should be suppressed as militating against foliage development. Must be carefully shaded from direct sunshine, but otherwise ample light beneficial to coloration.

C. T. D.

Campanula Medium and its Varieties. By B. A. Plemper (*Oester. Gart. Zeit.* vol. vi. pt. 4, pp. 130-136).—The varieties of 'C. Medium' are illustrated by 4 figures.—S. E. W.

Carnation Stems, Composition of, with regard to Rigidity. By L. Fondard and F. Gauthié (*Jour. Soc. Nat. Hort. Fr.* series iv. vol. xi. Dec. 1910, p. 845).—A comparison between the chemical constituents of the stems of native French carnation flowers and of those of imported American varieties, considered in relation to soil and added nourishment, seems to point to possibilities of gradually reproducing the superior rigidity of the American plants in the older races. A French carnation with a specially limp stem was chosen for comparison with three American varieties, and tables are given to show that except in the matter of potash there was no difference in the chemical composition of the leaves in all four kinds. The composition of the stalks

on the other hand differed very considerably, and it is considered possible that added rigidity of stem might be obtained by a judicious choice of fertilizers.—*M. L. H.*

Caterpillar, Yellow-Bear, Biological and Economic Notes on the. By H. O. Marsh (*U.S.A. Dept. Agr., Bur. Entom., Bull.* 22, pt. v., Aug. 1910; 1 fig.).—The yellow-bear caterpillar (*Diacrisia virginica* Fab.) worked great havoc among the sugar-beets grown in the Upper Arkansas Valley of Colorado during the late summer and autumn of 1909. The larvæ of the first generation developed on weeds along the fences and ditches and did not interfere with cultivated crops, but those of the second generation which began to develop about the middle of August were so numerous that the weeds were not sufficient to support them, and they spread to sugar beets and other crops.

Arsenical washes were found to be quite useless, and Paris green was not entirely successful. Burning weeds and clearing ditches, with clean cultural methods generally, appeared to be the most effective way of dealing with the pest.—*V. G. J.*

Cattleya Rex (*Bot. Mag.* tab. 8377). Peru. Family *Orchidaceae*; tribe, *Epidendraceae*. Epiphyte; leaves, 6-12 inches long; sepals, oblong-lanceolate, 3 inches long, ivory-white; petals, elliptic, margins, wavy, 3 inches long, ivory-white; lip, entire, 2 inches across, oblong, 3 inches long; lateral lobes, yellow, rose-coloured, with dark red veining; border rose, with deeper-coloured spots.—*G. H.*

Chaenomeles (Cydonia) Maulei var. **Sargenti**. By S. Mottet (*Rev. Hort.* May 1, 1911; p. 204-205; col. plate).—The plate represents a very attractive form of Quince, with brilliant scarlet flowers and abundant inflorescences. Other kindred varieties are described with white flowers, various deep reds, and a form with tri-coloured foliage, all highly recommended as early flowering decorative trees.—*C. T. D.*

Chinch Bugs, Burning. By T. J. Headlee (*U.S.A. Exp. Stn. Kansas, Dept. Entom., Circ.* 16; Nov. 1910; 5 figs., 2 tables).—The chinch bug establishes winter quarters in clump-forming grasses, and unless they are destroyed wheat, corn, and cane will suffer from its depredations.

Running fire over the infested grass-lands so as to burn the clumps or bunches down to the crown will destroy most of the bugs.—*V. G. J.*

Chlorotic Fruit Trees and their Treatment with Sulphate of Iron. By M. Coffiquiez (*Pom. Franç.*, 1911, No. 5).—Sulphate of iron introduced into holes drilled in the stems of chlorotic pears effected a cure. The operation is performed in July, and the trees were generally improved in September, and in the following year completely recovered. The iron is introduced in powdered form.—*E. A. Bd.*

Christmas Rose, Fungoid disease of (*Jour. Soc. Nat. Hort. Fr.* series iv. vol. xii. May 1911, p. 222).—A note on a fungus affecting the

leaves of the Christmas rose. The fungus (*Coniothyrium hellebori*) is already known on wild hellebores, but has lately been causing serious damage to cultivated varieties. To preserve the garden plant from its ravages, it must be treated with Bordeaux mixture before the appearance of the yellow stains caused by the disease upon the leaves. Once the mycelium is propagated in the tissues of the plants nothing more can be done.—*M. L. H.*

Chrysanthemum Growers, International Congress of (*Jour. Soc. Nat. Hort. Fr.* series iv. vol. xi. Nov. 1910, p. 710).—The discussions at this Congress were concerned chiefly with the best times for striking and pinching chrysanthemums and with methods of preventing rot in the flowers. The habits and ways of individual varieties are said to differ, and to achieve the best results it is necessary to study each variety and to perform all cultural operations at the period which best suits its individual peculiarities.

It is impossible to cure rot in the flowers once it has appeared. It only remains to remove each affected bloom carefully and burn it.

To prevent the disease avoid excess of nitrogenous manure at any time, and give none once the flowers begin to expand.

Remove the plants under cover at this period and only water when necessary, avoiding overhead moistening. Give plenty of air, more being required with a high than with a low temperature. Dry air is a great preventive of grey-rot. From the month of September the following fungicides will be of use, those in powder being the most efficacious :—

Powdered steatite	92 per cent.
Aluminium sulphate	3 „ „
Sulphate of lime	4 „ „
Iron sulphate	1 „ „

used freely every fifteen days.

The steatite is of no advantage chemically but is an invaluable vehicle.

This is Barello's formula.

The following three mixtures of Lacharewicz may be used, the first two in dry weather, the last in wet. They should be prepared at the time of use :—

1. Plaster of Paris	60 per cent.
Sulphosteatite containing 20 per cent. of copper sulphate	40 „ „
2. Plaster of Paris	60 „ „
Talc	32 „ „
Sulphosteatite of copper	8 „ „
3. Plaster of Paris	55 „ „
Soap powder	5 „ „
Sulphosteatite containing 20 per cent. sul- phate of copper	40 „ „

Burnat's formula^{as} is as follows:—

Hydraulic lime	50 per cent.
Steatite	30 " "
Cement	20 " "

and M. de Istwaufi's:—

Bisulphate of lime	10 per cent.
Powdered clay	90 " "

The lime may be replaced by bisulphate of magnesium.—*M. L. H.*

Chrysanthemums, Classification of (*Jour. Soc. Nat. Hort. Fr.* series iv. vol. xii. Jan. 1911, p. 48).—The chrysanthemum section of the National Horticultural Society of France has completed its annual revision of the classified lists of the best varieties of the plant. A group of single chrysanthemums has been added to those in earlier lists, and other groups are slightly altered in order and in classification.

M. L. H.

Cirrhopetalum longissimum (*Bot. Mag.* tab. 8366).—Siam. Family *Orchidaceae*; tribe, *Epidendreae*. Herb, epiphyte; leaves, 3½-6 inches long; scapes curved, 8 inches long; flowers in umbels of 4-7; sepals greenish with red veins; petals, oblong-lanceolate with very long slender tails, white.—*G. H.*

Cladothamnus pyrolaeiflorus (*Bot. Mag.* tab. 8353).—North-west Africa. Nat. ord. *Ericaceae*; tribe *Rhodoreae*. Shrub, 4-10 feet high; leaves, almost sessile, lanceolate, ¾-2 inches long; flowers terminal, calyx-lobes leafy; petals oblong, yellowish-red; style declinate; capsule, subglobose.—*G. H.*

Clematis aristata var. **Dennisae** (*Bot. Mag.* tab. 8367).—Australia. Family *Ranunculaceae*; tribe, *Clematideae*. Shrub, diœcious, evergreen, climbing; leaves 3-foliate; panicles many flowered; male flowers, sepals white, ¾-1 inch long; stamens, filaments salmon-red, anthers yellow.—*G. H.*

Clematis montana var. **Wilseni** (*Bot. Mag.* tab. 8365).—China. Family *Ranunculaceae*; tribe, *Clematidae*. Shrub, climbing; leaves, 3-foliate; peduncle, 1-flowered, 2 inches across; sepals white.—*G. H.*

Clematis montana, Hybrid (*Rev. Hort.* June 1, 1911; p. 244).—Description of three varieties listed by MM. Lemoine, Nancy, as hybrids between *C. montana grandiflora* and *C. montana rubens* viz. *C. montana lilacina*, blue lilac colour, flowers like *rubens* but larger. *C. montana perfecta*, flowers one third larger than *C. montana grandiflora*, perfect form, wide sepals and bluish white, resembling *Anemone sylvestris grandiflora*; and *C. montana undulata*, flowers 7 to 8 centimetres diameter, sepals wavy and white tinted blue.—*C. T. D.*

Codling Moth, On the Nut Feeding Habits of the. By S. W. Foster (*U.S.A. Dept. Agr., Bur. Entom., Bull.* 80, pt. 5 Sept. 1910; 2 plates).—The codling moth has hitherto been considered as a serious enemy of apples and pears only, although frequently found in plums and peaches. In 1887, 1895-6 reports were received of the larvæ attacking walnuts, but there was insufficient evidence to prove the statements.

In 1909 a large walnut tree adjacent to a pear-packing shed near Concord, Cal., was found to be infested by the larvæ of the codling moth. Search through Contra Costa County, Cal., showed the trouble to be general but light, except where trees were near packing-sheds, drying grounds, or a badly-infested pear orchard.

So far all observations indicate that only the later broods of larvæ attack the walnuts. Assuming that the larval life in walnuts is the same in length as in apples and pears, the earliest date of infestation would be late August or early September. The 'Bartlett' pear crop in the locality is picked prior to this time and before all the second-brood moths have developed. It is therefore probable that these late-appearing individuals seek the walnut as the only remaining plant suitable for oviposition. Thorough search in May and June 1910 failed to show the presence of any larvæ on trees that were badly infested last season.—V. G. J.

Coelogyne (*Oester. Gart. Zeit.* vol. vi., pt. 4, pp. 144-149 (Continuation), and pt. 5, pp. 186-191; 1 fig.).—A list of the members of the genus *Coelogyne* showing their geographical distribution and the date of their introduction into cultivation in Europe.—S. E. W.

Columnnea gloriosa (*Bot. Mag.* tab. 8378). Costa Rica. Family *Gesneriaceae*; tribe, *Cyrtandreae*. Herb, epiphytic, perennial; stems, prostrate or pendant; leaves, opposite ovate, $\frac{3}{4}$ -1 $\frac{1}{4}$ inch long; flowers, axillary erect; corolla, scarlet and yellow, 2 $\frac{1}{2}$ -3 inches long.—G. H.

Corfu. By C. Sprenger (*Oester. Gart. Zeit.* vol. vi. pt. 2, pp. 60-63).—As a result of the complete destruction of the forests the climate of Corfu is wet in winter and very dry in summer. The *Macchia* is composed of *Quercus coccifera*, *Erica verticillata*, *E. arborea*, *Arbutus Unedo*, *Viburnum Tinus*, *Myrtus communis*, *Pistacia Terebinthus*, *P. Lentiscus*, *Salvia triloba*, *Laurus nobilis*, *Cistus creticus*, *C. villosus*, *C. albidus*, *C. monspeliensis*, and the Cypress. Calceolarias, Fuchsias, and tree ferns do not thrive, but Araliaceae and palms from dry countries flourish. Primulas, Cinerarias, *Schizanthus*, *Myosotis*, Campanulas, *Leucojum* and Tulips, amply repay the trouble of cultivation. The water supply is very hard so it is impossible to grow Azaleas, Rhododendrons or Camellias.—S. E. W.

Corn, Stand and Soil Fertility as Factors in the Testing of Varieties of. By C. A. Mooers (*U.S.A. Exp. Sta. Tennessee, Bull.*

89, July 1910; 4 diagrams).—Some of the best "poor-land" varieties are not the heaviest yielders on rich soils, while a number of varieties have been found which are valuable only on relatively rich land. The factor of stand, with special reference to optimum stand, which may be defined as the number of stalks per unit area which will produce the largest yield under any given soil and climatic conditions, is shown, by the results of the trials detailed, to be of considerable importance.

A. P.

Corsican Pine in Dorset. By J. M'Callum (*Trans. Roy. Scott. Arbor. Soc.* xxiv. 1, p. 45-47; January 1911).—Recommends this tree for soils on Bagshot Beds where the natural herbage is heather, gorse and sedge. This tree grows well, maintains a canopy and sheds a heavy layer of leaves so that the soil is kept cool and moist, an essential factor on these poor soils.—W. G. S.

Cotton, Egyptian, Breeding new types. Thos. H. Kearney (*U.S.A. Dept. Agr., Bur. Pl. Ind., Bull.* 200; 34 pp.; 4 plates).—An account of new types of cottons bred from recently-introduced Egyptian varieties. The most valuable varieties are considered to be "mutations" and are now ready for field trials. They show the high degree of uniformity so desirable for commercial purposes.—E. A. Bt.

Cow-Pea Curculio, The. By Geo. G. Ainslie (*U.S.A. Dept. Agr., Bur. Entom., Bull.* 85, pt. viii.; Sept. 1910; 3 figs.).—The cow-pea weevil passes the winter in its adult stage, hibernating only when its food-supply is cut off by frosts in the autumn. It emerges in the spring and immediately commences to feed on cotton or other fresh young plants as they appear until the cow-pea pods are sufficiently grown to permit oviposition.

When breeding, this weevil confines itself almost entirely to the cow-pea and allied legumes. Young cotton is frequently damaged by it in the spring, but as this trouble occurs only on land on which cow-peas were grown the previous year, it is apparent that cotton is a food plant rather from necessity than choice.—V. G. J.

Crown-gall of the Grape, Field Studies of the. By G. G. Hedgcock (*U.S.A. Dept. Agr., Bur. Pl. Ind., Bull.* 183; July 1910; plates).—A disease known in America as black-knot, crown-knot, root-knot, crown-gall, and root tumour, and in Europe as grind, kropf, broussins, roгна, tuberculosi, &c. is described. Two forms are distinguished: a rough, often hard excrescence on stems, and a soft form on the root. The disease is probably found wherever the vine is grown. It is caused by the attack of *Bacillus tumefaciens* (see *Jour. R.H.S.* xxxvi., p. 779), and the entrance of the disease is favoured by injuries such as are caused through freezing and late frosts, pruning, &c. The effect is very destructive, often killing or stunting nearly all the vines in a vineyard in a few years. The galls usually develop

annually, rotting away at the end of the growing season, the rot killing the adjacent tissues and cutting off the circulation of the vine, having much the effect of a canker. 'Muscat of Alexandria' and 'Mission' were found among the most susceptible varieties of vine, but none were found to be entirely immune. Some, however, possess a high degree of resistance, especially 'Rupestris St. George' and 'Lenoir.' Among others, 'Feher Szagos,' 'Sweetwater,' 'Seedless Sultana,' 'Carignane,' 'Grenache,' 'Gros Colman,' 'Mataro,' 'Black Malvoisie,' and 'Burger' have been found more or less resistant on their own roots in Mexico, and with the first two mentioned are recommended for planting in infected vineyards.

The disease is communicated by water of irrigation, by cuttings from diseased plants, probably by the pruning knife, and by insects. It is recommended that cuttings and young vines should be planted deeply to avoid injury from frost, and that plants should be propagated under the supervision of the grower. The time of pruning should be either before or just after the period of sap flow, and winter protection from frost should be given.—*F. J. C.*

Crown-gall, The relation of, to Legume Inoculation. By K. F. Kellerman (*U.S.A. Dept. Agr., Bur. Pl. Ind., Circ. 76; March 1911*).—This circular points out the characters that distinguish the nodules produced by nitrogen-fixing bacteria on the roots of clover and lucerne from those produced by *Bacillus tumefaciens*, the crown gall organism. The 'nitrogen-fixing nodules' are outgrowths from the root, and have no more apparent effect upon the root than an ordinary branch; the interior contains flesh-coloured cells full of bacteria, which may easily be seen under the microscope. The crown-gall tumour causes much distortion of the root, and frequently the production of branches from the tumour itself; the interior of the tumour is white, and it is difficult to demonstrate bacteria in the cells, even with the most careful preparation.

In the laboratory the nodule bacteria are found not to absorb colour from agar coloured with Congo-red as do the crown-gall organisms, and the latter produce nitrite in media containing nitrate, which the former do not.

The fact that leguminous plants act as hosts for the crown-gall organism may be of economic importance when sugar-beets or orchard trees follow on the same soil.—*F. J. C.*

Cymbidium insigne. By F. Ledien (*Orchis*, vol. v. pt. 4, pp. 51-52; 1 plate).—*Cymbidium insigne* is found on grassy slopes in South Annam at an altitude of 5,000 feet. The long flower stems bear 15 to 20 flowers from December to January. This orchid must be treated like an *Odontoglossum* in summer.—*S. E. W.*

Dahlia imperialis. By S. Mottet (*Rev. Hort.*, Feb. 1, 1911, pp. 61-63; 2 illus.).—This dahlia, which assumes the form of a robust shrub 12 or 14 feet high, bearing an abundant inflorescence of large

white single flowers, does not appear to be quite hardy, but, from the general description, might be well worthy of trial on some of the sheltered positions in Cornwall and elsewhere on our western coasts. It flowers in November, and, judging by the illustration, is then a very beautiful object. It produces large tubers, and the treatment is much the same as for the ordinary dahlia, being planted, after a complete rest in deep pans in April in rich soil, and put out when frosts are over. Does not lend itself to previous forcing.—*C. T. D.*

Dahlias, Source, Culture, and Diseases of (conclusion). By K. Schechner (*Oester. Gart. Zeit.* vol. v. pt. 12, pp. 465-471).—Improved varieties of the dahlia have been obtained by careful crossings, judicious selection, and good cultivation. Dahlias are increased by cuttings from sprouted tubers.

Dahlia seed is sown in a hot bed about the end of March. The seedlings are hardened off and planted out towards the middle of May. The seed may be kept for ten years before planting.

In summer liquid manure is beneficial. In a damp situation, basic slag should be given. If the plants make many side branches, these should be removed in June or July. When the dahlias are cut down by frost, the stem is removed about 8 inches from the ground, the tubers forked up, dried and placed in a building where they are protected from frost.

Tubers attacked by sclerosis must be destroyed. Earwigs and two kinds of caterpillars, *Mamestra oleracea* and *M. persicariae*, are the chief enemies of the dahlia. *Dahlia viridiflora* is a good pot plant.

S. E. W.

Deinanthæ caerulea (*Bot. Mag.* tab. 8373). China. Family *Saxifragaceae*; tribe, *Hydrangeae*. Herb, perennial, 1-1½ foot high. Stem, solitary; leaves 4, near top of the stem, wide, elliptic; panicle, terminal; peduncle, 2-6 inches long; fertile; flowers 1½ inches across, lavender.—*G. H.*

Dendrobium Coelogyne. By E. Miethe (*Orchis*, vol. iv. pt. 4, pp. 122-123; 1 plate).—This orchid flowers in autumn. The sepals and petals are dark, yellowish-green, with reddish-brown spots; the labellum is dark purple, and there is an orange-coloured spot in the throat.—*S. E. W.*

Dendrobium Dartoisianum (*Bot. Mag.* tab. 8352).—Indo-China. Family *Orchidaceae*; tribe, *Epidendreae*. Herb, 1½-2½ feet long; leaves 3½-4 inches long; racemes short; flowers, showy, pale yellow with purple-tipped sepals, and petals wavy; and a purple-streaked lip-base.—*G. H.*

Dendrobium muricatum var. munificum (*Bot. Mag.* tab. 8371).—New Caledonia. Nat. ord. *Orchidaceae*; tribe, *Epidendreae*. Epiphyte. Leaves, 3-9 inches long; flowers, 1½ inch across; sepals greenish, spotted with purple; petals whitish-green spotted at end; lip, purple base, yellow apex.—*G. H.*

Diamond-backed Cabbage Moth. By W. W. Froggatt (*Agr. Gaz. N.S.W.* vol. xxi. pt. 10, pp. 894-899; 6 figs.).—The larvæ of this moth (*Plutella cruciferarum*) may be destroyed by watering the cabbages with boiling water from a fine hose, or by spraying with kerosene emulsion, or by sprinkling a mixture of tobacco dust (1) and lime powder (4) over the plants.—*S. E. W.*

Dombeya Coria. By H. Cayeux (*Rev. Hort.* Feb. 16; pp. 84-85; col. plate).—The plate depicts a very handsome corymb of flowers of Fritillary-bell shape about the size of *Fritillaria Meleagris*, but of a rose colour tinged inside with mauve. Very floriferous indeed, suitable for cold conservatory in pots in good leafy soil. Habit robust, attaining a height of over 5 feet. Doubtfully hardy as yet. Easily propagated by cuttings of semi-woody shoots.—*C. T. D.*

Douglas Fir. By W. H. Whellens (*Trans. Roy. Scott. Arbor. Soc.* xxiv. 1. p. 47-51; January 1911). Observations on the growth of this tree in Surrey and in Wales. The following soils are suitable: loamy clays, limy soils, lighter clays; sandy soils are less favourable, and gravelly soils are least suitable. Much depends on the provision of shelter from wind and frost, as in these respects the Douglas is very exacting.—*W. G. S.*

Drought-resistant Plants and their Breeding. A. C. Dillman (*U.S.A. Dept. Agr., Bur. Pl. Ind., Bull.* 196; 40 pp.; 4 plates).—An account of the history of these investigations and reference to work now in progress with Alfalfa, Sorghum, Millet, and various grasses. An interesting point is the possibility of cultivating various fodder plants by means of surface tillage in arid regions, and the emphasis laid on this method of conserving the sub-soil water.—*E. A. Bd.*

Dry-Farming in Relation to Rainfall and Evaporation. By L. J. Briggs and J. O. Belz (*U.S.A. Dept. Agr., Bur. Pl. Ind., Bull.* 188, Nov. 1910; 1 plate, 23 figs.).—Alternate cropping and summer tillage is generally recognized as the most highly developed dry-farming method, and considerable areas in Central Utah, where the annual rainfall does not exceed 13 inches, are cultivated in this way (p. 8). Dry-farming regions are generally considered to be those with an annual rainfall of not more than 20 inches or less than 10, and there are some in which other methods of dry-farming than the above give better returns. The normal rainfall of any district is not the only factor to be considered, for there are others of great importance which are often ignored by intending settlers, such as the seasonal distribution of the rainfall, the frequency of torrential rains, the loss of water through surface run-off, the occurrence of hail, and the amount of evaporation. Each of these factors is considered in detail with reference to the vast areas in the great basin and the great plains where dry-farming methods are employed. Gardeners would do well to ponder the fact that small rains which pack the dust mulch and

form a surface crust, lead to such an increase of evaporation from the surface soil that more moisture is lost than gained by the rain unless the surface is loosened again as soon as possible, and this on a large scale means expense (p. 15). A fine surface mulch on summer-tilled land, while ideal in preventing evaporation, packs so quickly during a torrential rain that much of the water runs off and is lost, and where such rains are to be expected, a rough, uneven, lumpy surface is preferable, the treatment of the land so as to absorb all the rain that falls being a matter of the greatest importance to the dry-farmer (p. 16). In a region having an evaporation during the six summer months of 45 inches and an annual rainfall of 18, it is possible by cultivation to cut the evaporation from the soil to half the amount of the rainfall and so save the remainder of the crop (p. 19). It is considered that there is no region in the United States where dry-farming is successfully conducted with so low a rainfall as in Southern Washington and Northern Oregon, where wheat is being grown at a profit by summer-fallowing methods on an annual rainfall of 10 inches. The minimum annual rainfall necessary for a wheat crop that will return more than the cost of production appears to be about 8.5 inches (p. 25).

A table is appended giving the elevation and average annual precipitation for a given number of years for some 1500 stations in the Western States.—A. P.

Elaeagnus argentea (*Bot. Mag.* tab. 8369).—North America. Family *Elæagnaceæ*. Shrub, 14 feet high, bark, scaly; leaves, lanceolate, with a faint metallic sheen above and silvery scales below; flowers fascicled; corolla, pale yellow.—G. H.

Felicia petiolata (*Bot. Mag.* tab. 8370).—South Africa. Family *Compositæ*; tribe *Asteroideæ*. Under-shrub, more or less prostrate; leaves obovate, $\frac{1}{3}$ to 1 inch long; peduncles solitary, 3 inches long; ray-florets about 12, rose-coloured; disk-florets, yellow.—G. H.

Flora, Adventitious, of Corfu. By B. Sprenger (*Oester. Gart. Zeit.* vol. vi. pt. 1, pp. 1-5).—In Corfu seeds carried by birds or the wind on to the trunks of the palms frequently germinate, covering the stems with a luxuriant growth, eventually killing the palm.

The following indigenous plants have been observed on the palms: *Polypodium vulgare*, *Adiantum*, *Ceterach*, *Pteris*, *Clematis Vitalba*, *Anemone coronaria*, *A. fulgens*, *A. blanda*, *Ranunculus flabellatus*, *R. asiatica*, *Nigella damascena*, *Papaver Rhoeas*, *P. nudicaule*, *P. apulum*, *Fumaria capreolata*, *Arabis verna*, *Matthiola incana*, *Cheiranthus Cheiri*, *C. maritima*, *C. Chia*, *Brassica insularis*, *Moricandia arvensis*, *Lunaria* sp., *Alyssum saxatile*, *Lepidium graminifolium*, *Capsella grandiflora*, *Reseda lymphæa*, *Cistus creticus*, *C. incanus*, *C. monspeliensis*, *Viola odorata*, *V. suaveolens*, *Silene pendula*, *S. vespertina*, *Saponaria calabrica*, *Linum pubescens*, *Geranium lucidum*, *G.*

Robertianum, *Erodium Botrys*, *E. malacoides*, *E. moschatum*, *Zizyphus Lotus*, *Rhamnus Alaternus*, *Pistachia Lentiscus*, *Cercis Siliquastrum*, *Calycatome infesta*, *C. villosa*, *Trigonella corniculata*, *Trifolium xanthinum*, *Psoralea bituminosa*, *Colutea arborescens*, *Rubus ulmifolius*, *Poterium spinosum*, *Myrtus communis*, *Sempervivum*, *Hedera Helix*, *Viburnum Tinus*, *Rubia tinctorium*, *Bellis silvestris*, *Phagnalon graecum*, *Evax pygmaea*, *Leontodon asper*, *Campanula drabifolia*, *C. ramosissima*, *Specularia perfoliata*, *Erica verticillata*, *Arbutus Unedo*, *Olea europaea*, *Periploca graeca*, *Nerium Oleander*, *Chlora perfoliata*, *Borago officinalis*, *Myosotis silvatica*, *Scrophularia heterophylla*, *Veronica peloponnesiaca*, *Verbena officinalis*, *Salvia triloba*, *Phlomis fruticosa*, *Lamium bifidum*, *Stachys spinulosa*, *Thymbra spicata*, *Cyclamen neapolitanum*, *Laurus nobilis*, *Osyris alba*, *Euphorbia peploides*, *Ficus Carica*, *Platanus orientalis*, *Urtica membranacea*, *Parietaria lusitanica*, *Celtis australis*, *Quercus lanuginosa*, *Q. coccifera*, *Crocus Boryi*, *Pinus halepensis*, and *Cupressus sempervirens*; also imported plants such as *Antirrhinum majus*, *Campanula Medium*, *Phoenix leonensis*, *P. reclinata*, *P. canariensis*, *Chamaerops humilis*, *Freesia refracta*, *Asparagus Sprengeri*, *Primula obconica*, *Reseda odorata*, *Myosotis oblongata*, *Viola cornuta*, *Lippia repens*, *Nierembergia rivularis*, *Broussonettia papyrifera*, *Paulownia imperialis*, *Euonymus japonicus*, *Chrysanthemum foeniculaceum*, *Campanula pyramidalis*, *Colvolvulus mauritanicus*.

It is a local custom to sow annuals on the stems of the palm trees.

S. E. W.

Forcing, Curious Mode of. By G. T. Grignani (*Rev. Hort.*, August 1, 1911, p. 362-3).—Dr. J. Weber has discovered that the simple insertion of a sewing needle, not too fine, into the base of dormant buds of Lilac, sufficiently deep to reach the centre, causes the bud to develop, under forcing temperature, two or three weeks sooner than untreated ones. The piercing effected, the needle is withdrawn. A number of experiments with, in every case, severed branches of other plants, is cited in proof of the efficacy of the process. Another scientific investigator, M. Jensen, of Vienna (*Rev. Hort.*, August 16, 1911, p. 369-70), independently and without knowledge of Dr. Weber's discovery obtained like results with the Vine, *Robinia* and *Witch Elm* by the same perforating process followed by forcing.—C. T. D.

Forestry Education. By E. P. Stebbing (*Trans. Roy. Scott. Arbor. Soc.* xxiv. 1, p. 24-42; January 1911). In this address, the author utilizes experience gained in continental schools to suggest the requirements of a modern teaching centre for forestry in this country, viz.: a strong teaching staff, good museums, a forest garden, and forest educational woods.—W. G. S.

Francoa ramosa hybrids. By P. Böhme (*Gartenflora*, vol. vi. pt. 6, pp. 128-129; coloured plate).—Hybrids of *Francoa ramosa*

and *F. appendiculata* have larger flowers than their parents. It is best to grow them in pots, protecting them from frost in winter.

S. E. W.

Fruit Farming in Austria, Organization of. By J. Sobischek (*Oester. Gart. Zeit.* vol. vi. pt. 1, pp. 22-30).—To facilitate the marketing of fruit the author proposes that only two kinds of fruit should be grown in a given locality and that a government department should decide which varieties are to be cultivated.—S. E. W.

Fruit of Pears, Influence of Leaves on. By G. Rivière and G. Bailbache (*Jour. Soc. Nat. Hort. Fr.* series iv. vol. xi. Nov. 1910, p. 673).—Tables are given showing, as the result of experiments with pear trees, how seriously the sugar content and weight of the fruit is reduced by the loss of leaves, not only from the fruiting spur itself, but also from other parts of the tree.—M. L. H.

Fruit Trees, Propagation of. By C. F. Cole (*Journal of Agr., Vict.*, June, July, August, 1911).—Gives very full information on methods of propagation, and stocks suitable for the different varieties of apple, pear, apricot, peach, nectarine, almond, cherry, plum, medlar, mulberry, citrus, olive, nuts, &c., grown in Victoria.—C. H. H.

Fruits, New. By L. C. Baltet (*Oester. Gart. Zeit.* vol. vi. pt. 3, pp. 84-87; with 3 figs.).—‘Mayflower’ is a new early peach of excellent flavour, resembling ‘Amsden’ and ‘Alexander,’ but is ripe twelve days sooner. The peach ‘Ray’ is vigorous and prolific, bearing large fruit. It ripens before ‘Précore de Hale’ and after ‘Amsden.’

The pear ‘Beurré d’Avril’ is one of the best flavoured late pears. It ripens in March, and can be kept dry till May.—S. E. W.

Fumigation. By W. J. Allen (*Agr. Gaz. N.S.W.* vol. xxii. pt. 3, pp. 212-222; 3 figs.).—The best time for fumigating with hydrocyanic acid is just after the scale insects are hatched. The operation is carried on at night. The trees are covered with tents. Failure is due to inaccuracy in measuring the size of the trees, holes in the tents and not weighing the cyanide and sulphuric acid accurately. A table shows the amount of acid, water and cyanide to be used for trees of different dimensions. After spraying with Bordeaux mixture, trees must not be fumigated for at least six months.—S. E. W.

Ginkgo biloba. By L. Henry (*Rev. Hort.* Feb. 16, pp. 80-84, and March 16, p. 125; 3 illustrations).—A very interesting article on the origin and peculiarities of this unique tree. The illustrations depict the normal form and two varieties, *longifolia* and *latifolia*, and several others are mentioned. The species is dioecious and the male form greatly predominates, but the fruit, which is almond-like and edible, can be freely produced by grafting female scions upon male trees. The evidence tends towards a Chinese origin. It is absolutely

hardy, and forms a magnificent and stately tree. The female foliage appears much sooner and perishes much later than that of the male.

C. T. D.

Gipsy Moth and Brown-tail Moth, Report on Field Work against. By D. M. Rogers and A. F. Burgess (*U.S.A. Dept. Agr., Bur. Entom., Bull.* 87; Aug. 1910; 12 plates, 22 figs., 1 map).—The gipsy moth caterpillar will eat almost any kind of vegetation, especially oak, willow, and apple; ash, juniper, and red cedar are often attacked by it, but maple is not touched if more desirable food is within reach.

Banding the trees before the egg masses hatch out with tangle-foot, a compound which retains its sticky character for several weeks, has been found the best remedy so far; the caterpillars cannot surmount the band, and this necessitates them feeding on the low undergrowth, which is poisoned with arsenate of lead.

The brown-tail moth is also dealt with.—V. G. J.

Graft Hybrids, Noteworthy. By Max Garnier (*Rev. Hort.* Dec. 1, 1910; pp. 559-60).—Mr. W. Hener, Head-Gardener to the Berlin University, has recently exhibited to the Prussian Royal Horticultural Society a very curious example of graft hybridization. *Solanum nigrum* grafted on *S. Lycopersicum* (Tomato) (or vice versa, the stock not being indicated), the resulting shoot produced on one side of the stem the growth of *S. nigrum* and on the other side that of *S. Lycopersicum*, while buds formed on the dividing line of this single stem showed quite different characters. One has the appearance and structure of a tomato branch, but is entirely glabrous like *S. nigrum*. On the opposite side a branch resembles *S. nigrum*, but has velvety leaves like the tomato. This is not all. At a certain height of the principal stem the longitudinal division mentioned ceases abruptly, and a shoot has been produced at that point, the two external foliar cell layers of which are of *S. nigrum* and all the rest *S. Lycopersicum*, the result being curved leaves owing to the different rates of growth of the two species. These three forms have been named respectively *S. Koelreuterianum*, *S. tubigense*, and *S. Gaertnerianum*. The first has not fruited, the second has borne fruits of the size and form of *S. nigrum*, but reddish like the tomato. The third or terminal shoot has produced fruits somewhat of tomato shape but of the black colour of *S. nigrum*, the size being intermediate.

The aubergin (*S. Melongena*) grafted on the tomato has also produced similar mixed characters, as also has *S. Dulcamara* grafted on the tomato. The similarity of such results to the case of *Cytisus Adami* is pointed out, involving a tendency to reversion which had so far been checked by suppression.—C. T. D.

Grafting. By W. J. Allen (*Agr. Gaz. N.S.W.* vol. xxii. pt. 2, pp. 101-108; 17 figs.).—The process of whip, strap, bark, and cleft grafting are clearly described and illustrated. Attention is called to the following points: The pruning knife must have a sharp edge; air must

be excluded from the cut parts; in strap grafting the stock and scion must fit perfectly.—*S. E. W.*

Grafting of Seedlings by Approach. By Max Garnier (*Rev. Hort.*, August 1, 1911, p. 347-8; one woodcut).—Description of a process by which young seedlings of Roses and many other plants can be grafted on stocks in such a way as to secure much more rapid development and flowering than by the ordinary methods of budding or grafting. The young plant together with its roots and a little soil is wrapped in a piece of coarse cloth tied with raphia after the upper part of the stem has been closely applied to the stock, leaving the terminal bud exposed. Careful watering enables the roots to assist development of the scion, which speedily unites with the stock and then rapidly develops. The illustration shows the roots removed and a projecting stem inserted into a glass vessel filled with water and suspended from the stock, the upper part of the stem being applied to the stock as above. The letterpress, however, advocates the detention of the roots as described. Roses are stated to produce full-sized flowers very shortly after the graft is perfected. Fruit trees are equally assisted by the same method.

C. T. D.

Grape, Ascogenous form of Fungus causing "Dead-arm" of. By C. L. Shear (*Phytopathology*, I, 4, pp. 116-119; Aug. 1911; figs.).—This disease is due to the fungus *Fusicoccum viticolum* Reddick (*U.S.A. Exp. Stn. Cornell, Bull.* 263, 331). The present communication records the discovery of the higher form of the fungus, the spores of which were found to produce the *Fusicoccum* form in pure culture. The higher (ascogenous) form of the fungus is named *Cryptosporella viticola* Shear, and a description and figures are given.—*F. J. C.*

Grease Bands. By A. Wernicke (*Oester. Gart. Zeit.* vol. vi. pt. 3, pp. 102-105).—Grease bands not only capture the codling and Winter moths but also destroy the goat moth and several kinds of weevils. The bands should be smeared in spring as well as in autumn, and the trees shaken early in the morning in spring.—*S. E. W.*

Gumming of Stone Fruit Trees. By R. Frantz (*Gartenflora*, vol. lx. pt. 4, pp. 82-83).—The application of half a pound of common salt dissolved in nine pints of water to each tree is a remedy for gumming in peaches, and also in plums and cherries.—*S. E. W.*

Gummosis of Prunus and Citrus, A Study on. By O. Butler (*Ann. Bot.* xxv. Jan. 1911; p. 107-153; 4 plates).—The author investigates the well-known disease of *Prunus* and *Citrus* known as Gummosis; he also records observations on the American diseases of *Citrus* termed Squamosis and Exanthema. With regard to the first named he treats amongst other things of the chemical nature of the gums produced, and the cause and cure of the same. He states that

gummosis of *Prunus* and *Citrus* are indistinguishable maladies, and that they are identical in histological development and causal relationships. The malady is due to hydrolysis of the walls of the embryonic wood-cells, which develop into susceptible tissue. The dissolution of the cell-walls begins in the secondary lamella and almost coincidentally in the primary membrane, the dissolution of the third lamella proceeds centripetally. The cell-contents are at no time actively concerned in gum formation, neither does starch play any rôle. Gummosis develops autogenously and is induced by all manner of traumatisms, provided they act directly or indirectly as growth stimulants on the cambium. The cambium must be actively growing and an abundant supply of water must be available at the roots.

Squamosis and Exanthema are diseases confined to America and need not be referred to in detail here.—A. D. C.

Inheritance in Maize. By E. M. East and K. K. Naves (*U.S.A. Exp. Stn., Conn., Bull.* 16; 1911; 140 pp., 25 plates).—The names of the authors give sufficient assurance that the experiments dealt with in this work have been carried out with the most minute care, and a description of methods used is therefore unnecessary.

After discussion of the material used, its suitability for genetic research, and a description of the varieties under notice, the authors pass to inheritance of endosperm characters (Part II.).

Starchiness and Non-Starchiness.—Starchy individuals, whether starch was in corneous or soft condition, were dominant when crossed with non-starchy (*i.e.* "sugar maize"), and the usual segregation occurred.

The difference of the two starches was studied chemically, and starchy grains were found to produce their starch on ripening at a steady rate, while in the non-starchy races an actual breaking down of endosperm materials into cane-sugars and various hexoses occurs.

Yellow and Non-Yellow Endosperm.—The yellow colour was found to be due to two pigments which do not seem to belong to the lipochrome series, but are probably to be classed as anthochlorins. Further experiment is to be made on this subject.

Yellow proved dominant, though in F₂ certain peculiarities occurred, but the extracted whites proved pure.

Purple and Non-Purple Aleurone Cells.—There are two pigments giving a purple colour, and though rough chemical tests show differences, they are probably to be considered as different stages of oxidation of the same colour base. A large amount of data is presented of the greatest interest, and the conclusion is reached that purple aleurone colour behaves as a normal Mendelian character in inheritance.

Xenia.—The authors, referring to Guignard's discovery of the non-maternal character of the endosperm, state that the old meaning of the word must of course be given up, and in their experiments the

effect of the second male nucleus has never extended to maternal tissue.

The work of Webber is discussed and the suggestion made that such cases as he brought forward may possibly be cases of Mendelian segregation in the somatic tissues, analogous to bad sports. A great deal of interesting evidence is offered of *Xenia* (in the modern sense), and the following law is formulated:—

“When two races differ in a single visible endosperm character in which dominance is complete, Xenia occurs only when the dominant parent is the male; when they differ in a single visible endosperm character in which dominance is incomplete or in two characters both of which are necessary for the development of the visible difference, Xenia occurs when either is the male.”

Podded and Podless Maize.—This is a case of great interest. The ordinary maize has the seeds naked, and when crossed with a variety with podded seeds the podding is dominant and the variation no more than seen in the pure podded parent.

The segregation was entirely discontinuous and extracted recessives pure.

Pericarp Colours.—The evidence on this point is not yet complete, and interesting work on the localization of the pigment is in progress.

Physical Transformations of Starchiness.—Although presence and absence of starchiness behaves as a Mendelian character, the physical condition of the starch behaves as a plant character affecting the whole ear.

Inheritance of Size.—The difficulties of this work are fully realized, and the authors content themselves with the statement that their results show segregation in every case.

Abnormal Forms.—Some interesting abnormalities are recorded, such as dwarfs, bifurcated ears, ears with lateral branches, and their inheritance described.

It is impossible to give more than an imperfect account of this important work, which must be studied in its entirety to be justly appreciated.—*E. A. Bd.*

Insects, Useful. By P. Lesne (*Rev. Hort.*, Jan. 16, 1911, pp. 34-36, coloured plate; also *Rev. Hort.*, Feb. 1, 1911, pp. 58-61, coloured plate).—Two very interesting articles describing and portraying a number of beetles and other carnivorous insects which are of value to the horticulturist as destroyers of insects inimical to plants, many of such practical friends being ignorantly destroyed, owing to non-recognition of their true character. The illustrations give a very clear idea of their appearance in both the larval and perfect forms, natural size and enlarged.—*C. T. D.*

Irrigation Problems. By J. A. Widtsoe (*U.S.A. Dep. Agr., Off. Exp. Stn., Bull.* 228, Aug. 1910; pp. 112-117).—The relation of soils to the proper use of irrigation water is a subject greatly in want of

systematic study. The movement of water in the soil and the rate of loss of soil water are influenced by numerous factors, and the value of these factors needs to be determined for a variety of soils. It is not even certain that surface cultivation will check evaporation from every soil, for one kind of soil has been found which invariably loses more water when cultivated than when left sun-baked. It is thought that plants cannot regulate the amount of water that they take from the soil, but, other conditions being the same, the larger the quantity of water presented to the plant roots the greater the amount used. Hence it is necessary to determine the optimum percentage of water that should be found in various kinds of soil after each irrigation, keeping in mind both the rate of assimilation and that of transpiration, the latter being influenced by the composition of the soil itself, so that the number of pounds of water required for the production of one pound of dry matter is increased or diminished according to the available plant food. Certain experiments have shown that the available soil fertility set free during one season by persistent hoeing has largely reduced the amount of water required for each pound of dry matter—in one case by nearly 20 per cent.; that two or more years of fallowing have reduced the water cost of dry matter by one-half or more; and that the addition of commercial fertilizers to somewhat infertile soils has made it possible to grow crops with very much smaller amounts of water than before. The bacterial life of the soil, as affecting fertility, is also strongly influenced by irrigation, and it seems to have been proved that the periodic application of irrigation water does affect definitely the production and distribution of nitrates.

The investigations necessary to determine the relations between plants and water under conditions of irrigation are very complex. In general, it has been found that with little irrigation water much more grain, potatoes, sugar-beets, and other crops, is produced per inch than with larger quantities of water, the crop-producing value of water appearing to get less up to a definite limit, beyond which an actual diminution of crop may result. It is estimated that the more moderate use of water, according to the finding of the experiments already conducted, would double or treble the irrigation area without adding to the storage and conduction of water for the purpose. Not only the total yield of the crop but its quality and manner of growth may be influenced. The time of maturing may be delayed or hastened; the relative proportions of plant parts—leaves, roots, stems, and seeds—may be varied, as well as the composition of the plants. It was found some years ago at the Utah station that by regulating the amount of water applied to wheat on a certain shallow soil the proportion of protein in the grain was raised from about 15 to 26 per cent., though it is thought such a great variation can only be accomplished under unusual conditions.

It is pointed out that to carry out irrigation investigations successfully needs the services of skilled men trained in various branches of science.—A. P.

Kennedya Beckxiana (*Bot. Mag.* tab. 8358).—Australia. Family *Leguminosae*; tribe *Phaseoleae*. Herb, climbing; leaves pinnately 3-foliate; peduncles 2-flowered; corolla $1\frac{1}{2}$ inch long; petals red, except for a greenish-yellow dark-margined patch at the base of the standard.—G. H.

Larch Sawfly. By A. Edwards (*Trans. Roy. Scott. Arbor. Soc.* xxiv. 1, pp. 42-44; January 1911).—Describes measures adopted to combat the large larch sawfly (*Nematus erichsonii*) at Thirlmere. The following were found useful: crushing larvæ by hand; spraying with arsenite of copper mixed with equal quantity of flour; dislodging larvæ by shaking the trees, and preventing return by tar band on stem.—W. G. S.

Larkspurs. By F. Reutersheim (*Gartenflora*, vol. lx. pt. 3, pp. 57-59).—Larkspurs require a sunny, open position and a good supply of water and mulching in dry weather. By cutting the flower-stems when the blooms fade, another crop of flowers may be obtained in autumn. *Delphinium Belladonna grandiflorum* 'Hesse' and 'Nassau' are good varieties.—S. E. W.

Leaf-fall, The Morphology of. By E. Lee (*Ann. Bot.* xxv. Jan. 1911, pp. 51-106; with 3 plates).—An anatomical investigation of method of leaf-fall in Dicotyledonous plants. After a summary of previous work the writer gives an account of the methods of defoliation obtaining in some 40 or 50 plants. His conclusions are as follows:—In Dicotyledons the essential modification at the leaf-base in connexion with leaf-fall is the formation of a *Separation-layer* which is produced from existing cells with or without division. The leaf separates from the stem by the disappearance of the middle lamellæ of the cells of the separation-layer, and the subsequent rupture of the sieve-tubes and vessels of the leaf-trace at that level. A *Lignified-layer* may or may not be present, but a *Protective-layer* is invariably produced either before or after leaf-fall.

The mode of formation of the *Protective-layer* is (1) ligno-suberization of the cells of the leaf-base with or without irregular division; (2) by ligno-suberization of cells produced by the continued division of a regular cambium. The protection of the tissues of the stem underlying the scar is aided by the production at a later date of a layer of cork cells which subsequently becomes continuous with the periderm of the stem. In many species the persistent leaf or leaf-scar is thrown off during the second year.—A. D. C.

Lilac Mite. By L. Linsbauer (*Oester. Gart. Zeit.* vol. vi. pt. 6, pp. 201-206; 1 fig.).—The lilac bud mite, *Eriophyes Löwi*, attacks *Syringa vulgaris* and *S. dubia*, but *S. persica* is immune. It causes excrescences in the form of an eruption of twiggy growths, the so-called witch's broom. Spraying is of no use; full exposure to sun and air is the best safeguard against this pest.—S. E. W.

Lilium pardalinum. By S. Mottet (*Rev. Hort.* May 1, 1911; pp. 214-215; illustration).—The illustration shows that the lily practically rises from a long rhizome rather than a bulb, evidencing a transition between the two types of root stocks, the rhizome resembling that of Solomon's Seal except that it is scaly. This results from the primary bulbiform root stock creeping horizontally, its vitality persisting for several seasons, a cylindrical scaly mass resulting, the lily being terminally produced during the season.—*C. T. D.*

Lime-water Bordeaux for Spraying. By D. McAlpine (*Jour. Agr. Vict.* Nov. 1910, pp. 728, 732).—Formula for 50 gallons: Copper sulphate, 10 oz.; lime-water, $8\frac{1}{2}$ gallons. Water to make up to 50 gallons. The object of using lime-water instead of milk of lime is the considerable reduction in the amount of copper sulphate needed, which is a saving of cost and also adds less copper to the soil, which might be detrimental. In spraying experiments with this mixture on apple trees at the School of Horticulture, Burnley, in 1908, lime-water Bordeaux was tested on apple trees, along with the ordinary Bordeaux mixture, with the result that both were equally efficacious in preventing black spot in apples. The former adhered just as well as the other, and it had the additional advantage of being free from gritty particles, of acting at once on the spores of fungus, and of containing a much smaller proportion of blue-stone.

The preparation is both quickly and easily made. The fresh quick-lime has first to be slaked. This may be readily done by just sufficient water to start the process and then adding more gradually, as it is absorbed. The process may be hastened by the addition of hot water, but it must be remembered that lime, contrary to the usual rule, is less soluble in hot than in cold water. When the slaked lime is mixed with water it may either form a cream or a milk of lime, according to the amount of water added. Lime is only very slightly soluble in water at the rate of about 1 lb. in 80 gallons of water, so that 1 lb. of lime will be ample for 50 gallons of lime-water. When sufficient water is added to the milk of lime, it is thoroughly stirred and then allowed to settle, and the clear liquid which forms on the top in about a quarter of an hour is lime-water. The lime-water is allowed to run into the barrel of the spray-pump, the necessary blue-stone in solution is added, and the barrel holding 50 gallons is then filled up with water, when the material is ready for spraying. Where spraying is done on a large scale, it will be found convenient to rig up barrels with cocks or spigots on an elevated platform. The lime-water could be made in one barrel and ordinary water contained in the other, so that both liquids could be run into the barrel of the spray-pump as required, without loss of time.—*C. H. H.*

Lonicera Henryi (*Bot. Mag.* tab. 8375). China. Family *Caprifoliaceae*; tribe, *Lonicereae*. Shrub; leaves, oblong-lanceolate, $1\frac{1}{2}$ - $2\frac{1}{2}$ inches long; flowers on 2-flowered peduncles; corolla, rose coloured.—*G. H.*

Lychnis grandiflora. By G. T. Grignan (*Rev. Hort.*, Jan. 1, 1911, p. 12; coloured plate).—A very handsome plant of good habit, flowers large, brilliant deep orange red on erect stalks. Not a new plant, but one which has been largely lost sight of, though well worthy of cultivation. As some doubt exists as to its absolute hardiness it is best to treat it as an annual. Several variations in colour have been noted and MM. Cayeux and Le Clerc have a strain of true salmon colour.—C. T. D.

Manure, Influence of, on taste of preserved vegetables. By M. Weinhausen (*Gartenflora*, vol. lx. pt. 7, pp. 145-151).—The use of a mixture of superphosphate, sulphate of ammonia and kainit improves the flavour of vegetables and does not prevent such preserved vegetables from keeping.—S. E. W.

Masdevallia pachyura (*Bot. Mag.* tab. 8361).—Ecuador. Family *Orchidaceae*; tribe, *Epidendreae*. Herb, dwarf and tufted, without pseudo-bulb; leaves, 3-4 inches long; scape, 6-9 inches long, 5-7 flowered; flowers, from tip to tip of perianth leaves, 2 inches, straw-coloured with reddish dots, the tails and mid-ribs of lateral sepals yellow.—G. H.

Meconopsis simplicifolia (*Bot. Mag.* tab. 8364).—Himalaya. Family *Papaveraceae*; tribe *Eupavereae*. Herb, leaves radical, 4-8 inches long; flower, single, 3 inches across, pale blue.—G. H.

Meliosma cuneifolia (*Bot. Mag.* tab. 8357).—Western China. Family *Sabiaceae*. Tree or shrub; leaves obovate-cuneate, 2½-7 inches long; panicle, pyramidal, 8 inches across; flowers, greenish-yellow, 3 lines wide.—G. H.

Millets. By G. A. Gamie (*Mem. Dept. of Agric., India (Pusa)*, iv. 1, 8 pp. and 5 plates; January 1911).—Description of botanical characters of genus *Setaria* cultivated in the Bombay Presidency: *S. glauca* and *S. italica* with varieties, illustrated by plates.—W. G. S.

Nitrogenous Manures, the Availability of Certain Unusual. By B. L. Hartwell and F. R. Pember (*U.S.A. Exp. Stn. Rhode Island, Bull.* 142, June 1910).—The materials used for a series of pot experiments were "nitrogenous manure," hide and skin meal, tartar manure, and beet-refuse compound, while dried blood and nitrate of soda were used for purposes of comparison, and calcium cyanamide to ascertain its effect when applied just before the seeds were sown. The "nitrogenous manure" was the most effective of the four first named, and yet it was only about half as valuable as dried blood, the same amount of actual nitrogen being applied in each case. The usual direction that calcium cyanamide should be applied a few weeks before planting seemed to be justified by the experiments, the germination and early growth of barley being delayed considerably by its application just before seed-time, though millet did not appear to be affected injuriously.

A. P.

Nitrogenous Manures, Crops as Affected by. By B. L. Hartwell, H. J. Wheeler, and F. R. Pember (*U.S.A. Exp. Stn., Rhode Island, Bull.* 143, June 1910).—This bulletin deals with the results of ten years' pot experiments conducted with the object of ascertaining the value of various materials as sources of nitrogen. Galvanized-iron ash-cans, 26 inches deep and 18 inches in diameter, served as pots, and these were sunk in the ground and well drained, 100 lb. of subsoil being placed at the bottom of each pot, and over it 123 lb. of surface soil (p. 292). Certain conditions which would have a very important influence upon the results were controlled as far as possible, among them being the amount of water, potassium, and phosphorus, as well as a reaction of the soil suitable to the plant and to the putrefaction and nitrification of the organic materials used, namely, dried blood, star fish, ground bone, hoof meal, tankage, ground fish, horn meal, and hen manure. Nitrate of soda was also used, and about 50 per cent. of the nitrogen applied in that form was recovered in the crops, which was a larger percentage than was recovered from the nitrogen applied in any organic form (p. 300). The conclusion is arrived at that, taking the entire ten-year period, all of the sources of organic nitrogen, including the dried blood, proved to have about the same degree of availability (p. 305). Although the crops from nitrate of soda frequently contained larger percentages of nitrogen they were not much heavier than those from the organic manures, the favourable action of the latter being probably due in part to the fact that a neutral reaction of the soil was practically maintained so that putrefaction and nitrification were favoured.—A. P.

Oils and Perfumery Plants in the United States, Production of Volatile. By Frank Rabak (*U.S.A. Dep. Agr., Bur. Pl. Ind.. Bull.* 195, Dec. 9, 1910; figs.).—Statistics are given showing what a large and active market there is in the United States for the products of the volatile oils derived from plants, to be used either as flavourings or in the manufacture of perfumes. It is pointed out that many of the plants from which volatile oils are obtained could profitably be grown in N. America or are already found there. The chemical and structural composition of aroma-bearing plants is described, the fact being made clear that not all volatile oils pre-exist in plants. Some of our most valuable oils are obtained from plants which, though not possessing the oil already formed in their tissues, do possess certain basal constituents from which volatile oils can be formed.

The methods of extraction and producing such oils are described, illustrations are given of the necessary apparatus, and instructions are added in the cultivation and harvesting of perfume-bearing plants.

M. L. H.

Oncidia, Regular flowering of. By F. Ledien (*Orchis*, vol. v. pt. 2, pp. 26-27).—The *Oncidia* flower more regularly when grown in pots or saucers, and annually transplanted, using a mixture of

polypodium fibre, sphagnum, well-rotted oak leaves and a small quantity of dry cow dung.—*S. E. W.*

Oncidium Sanderæ (*Bot. Mag.* tab. 8374).—Peru. Family *Orchidaceæ*; tribe, *Vandææ*. Epiphyte; leaves, 1-1½ foot long; sepals, reddish-brown, 3 inches long; petals, linear-lanceolate, 2½ inches long; lip, 3-lobed, crisped and wavy, yellow spotted with brown.—*G. H.*

Onion Manuring. *E. E. Prescott (Jour. Agr. Vict.* Feb. 1911, pp. 69,70).—Onion land always benefited by a heavy dressing of well-rotted animal manure of thirty or forty loads to the acre. Nitrate of soda is largely used, applied in three or four sowings, at intervals of two or three weeks, the first application being made when the onions have grown to the size of an ordinary lead pencil. An application of 300 lb. to the acre of nitrate of soda increased the crop by four tons, whilst 600 lb. increased the crop by nearly eight tons to the acre. Onion is a surface feeder, chiefly requiring nitrogen; an occasional dressing with potash is beneficial.

In the Gulf coast States of America onions are largely grown and the yield averages 300 bushels to the acre. The fertilizer in use in those districts is composed of:

Sulphate of Ammonia (25 per cent.)	200 lb.
Dried Blood	300
Cotton-seed Meal	300
Acid Phosphate	800
Muriate of Potash (50 per cent.)	400

C. H. H.

Orange Trees, Deep planted. By *C. Sprenger (Oester. Gart. Zeit.* vol. vi., pt. 5, pp. 167-172).—Deep planting is fatal to orange and lemon trees.—*S. E. W.*

Orchard Green-Manure Crops in California. By *R. McKee (U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 190, Oct. 1910; 9 figs.).—Californian soils, though often very fertile, are generally deficient in humus, and the practice of green-manuring for the remedying of this defect is now being extensively adopted in the citrus orchards of the southern part of the State. When, however, the soil is of so heavy a character that the enforced discontinuance of cultivation allows it to become quite hard and packed, thus permitting very imperfect aeration, green-manuring is not advisable (p. 10). Investigation has shown the superiority of certain crops over others for varying purposes and conditions, and no one plant appears to possess all the desirable qualities of the ideal green-manure crop. The plant chosen should be a legume where possible, in order to obtain the increased amount of nitrogen which is collected from the air; it should make good growth, for the sake of the increase of organic matter to turn under the soil, and it should be able to stand being trodden upon with the minimum of injury where it will be subject to it while in full growth, as in the gathering

of the fruit. In addition to this, uprightness of growth and non-twining stems are desirable to facilitate ploughing under (p. 11). The routine work of growing the crop is discussed, with the merits and demerits of the plants most generally grown in this State for the purpose. With horse beans it has been found that, to obtain the best results, it is necessary to inoculate the crop with the bacteria necessary to nodule formation the first year it is grown on any given soil in the northern part of the State, omission to do this in some districts resulting practically in the failure of the crop (p. 14). In Southern California this crop does not require artificial inoculation. Where it is necessary the surest results are obtained by mixing soil from an inoculated plot or field and sowing this with the seed at sowing time. Other methods adopted are the spreading of inoculated soil over the field at the time of seeding, and the inoculation of the seed with pure cultures.—A. P.

Orchard Spraying. By C. G. Woodbury (*U.S.A. Exp. Stn. Purdue Univ., Indiana, Circ. 21*, Feb. 1910; 17 figs.).—The insect and fungoid pests most troublesome in this State are discussed in detail, together with the most effective ways of dealing with them.—A. P.

Orchids (*Orchis*, vol. v. pt. 1; 2 plates).—This number of *Orchis* contains photographs of *Isabelia virginalis*, Rodr. from South America, and *Angraecum eburneum virens*, *Ansellia africana*, *Polystachia dendrobiflora* from German East Africa.—S. E. W.

Orchids, Garden. By R. Schlechter (*Orchis*, vol. v. pt. 3, pp. 58-61; 2 plates).—*Coelogyne chrysotropis*, from Sumatra, flowered in the Botanic Garden, Glasnevin. *Dendrobium Faulhaberianum* is larger and a stronger grower than *D. aduncum* which it closely resembles. It is a native of Hainan.

Sobralia Malmquistiana resembles *S. macrantha*. The flowers are pale-pink with an orange spot on the labellum.

Bulbophyllum chrysocephalum was fifteen years in the possession of the owner before flowering. The yellow flowers resemble those of *B. angustifolium* but are considerably larger.

Saccolabium sarcocholoides is the first member of the *Eu-Saccolabium* section from the Philippines. In October this orchid bears small white flowers with violet spots at the base of the petals and sepals. The small labellum is orange coloured.—S. E. W.

Orchids, Manuring of. By F. Ledien (*Orchis*, vol. v. pt. 3, pp. 41-46).—Good results were obtained by giving well-rooted strong-growing terrestrial orchids a very weak infusion of cow dung.—S. E. W.

Packing of Pears. By J. G. Turner (*Jour. Agr. Vict.* March 1911, pp. 190-194).—The fruit was first graded, wrapped in paper, and packed in trays measuring 18 inches long, 15 inches wide, and $2\frac{1}{2}$ inches deep. Each tray, both top and bottom, was packed with a layer of wood-wool. As the trays were filled they were cleated together in lots

of three trays with fine hoop-iron nailed around each of the packages, together equal to a bushel.—*C. H. H.*

Parks and Arboreta, Part II. and Supplement. By E. Goerze (*Oester. Gart. Zeit.* vol. v. pt. 12, pp. 459-464 and vol. vi. pt. 2, pp. 56-58).—This completes the list of trees and shrubs found in European parks. (See *Jour. R.H.S.*, vol. xxxvi.).—*S. E. W.*

Peach and Myrobalan (*Prunus cerasifera*) Crossed (*Pom. Franç.* 1911, No. 7, p. 219).—After many attempts M. Ohlhorn has succeeded in obtaining a hybrid between these two species (?). Like the Peach, three buds are associated, one flower, and two wood buds. (See also Apricot and Myrobalan.) (Quoted from *Pomologie Allemand.*)
E. A. Bd.

Pear ‘Bonne de Beugny.’ By Max Garnier (*Rev. Hort.*, June 16, 1911, p. 280; coloured plate).—A chance seedling found in France in 1875 which has since been widely disseminated on account of its fine appearance, flavour, and other qualities, including immunity from spotting. The plate represents a very attractive-looking fruit.—*C. T. D.*

Pear, New (*Oester. Gart. Zeit.* vol. vi. pt. 6, pp. 216-217; 1 fig.).—‘Belle Guerandaise’ is a prolific pear, bearing delicious juicy fruit which ripens in October and November.—*S. E. W.*

Pears, Gathering of. By Gabriel Luizet (*Pom. Franç.*, 2, Feb. 1911).—A long discussion as to the merits and time of gathering of ‘Beurré Blanc.’ The general advice given as to the gathering of Pears with a view to storing is as follows:—

“The early Pears should be gathered some time before they are apparently ripe. This interval should be gradually shortened as the medium varieties are reached, and the late kinds must be left as long as possible on the tree.” This is sound advice, and may be justly applied to Apples also.—*E. A. Bd.*

Pecan Leaf-blotch. By F. V. Rand (*Phytopathology*, I, 4, pp. 133-138; Aug. 1911; figs.).—This disease becomes visible on the lower surface of the leaf during midsummer in the form of dark blotches composed of minute black, spherical perithecia. The fungus causing this disease does not appear to be connected with the pecan scab fungus, *Fusicladium effusum*. It is apparently identical with *Sphaeria convescula* Schweinetz, and the name *Mycosphaerella convescula* Rand is proposed for it. Cultural characteristics and a technical description are given.—*F. J. C.*

Peridermium cerebrum Peck. and **P. Harknessii** Moore. By G. G. Hedgcock (*Phytopathology*, I, 4, pp. 131-132; Aug. 1911).—In inoculation experiments spores from *Peridermium cerebrum* growing on *Pinus virginiana*, *P. divaricata*, and *P. echinata* produced *Cronartium quercuum* on the leaves of the following species of *Quercus*:

Q. alba, *Q. densiflora*, *Q. densiflora* var. *echinoides*, *Q. Emoryi*, *Q. Gambelii*, *Q. lobata*, *Q. marilandica*, *Q. rubra*, *Q. californica*, *Q. coccinea*, *Q. phelbs*, *Q. pinus*, *Q. texana*, *Q. velutina*, *Q. undulata*, *Q. Michauxii*, *Q. minor*, *Q. virginiana*, and *Castanopsis chrysophylla*. Uredospores from *Q. rubra* produced abundant infection on other species of oak. Teleutospores inoculated into wounds produced galls on *Pinus divaricata*, *P. virginiana*, *P. ponderosa*, *P. Murrayana*, and *P. sylvestris*. Inoculations without previous wounding were unsuccessful, and no galls followed inoculation in *Pinus Strobus*. Witch's brooms were produced on some pines.

Peridermium Harknessii is morphologically indistinguishable from *P. cerebrum*, but attempts to inoculate oaks with the spores were unsuccessful.

In nature inoculation of the pine takes place through wounds made by insects.—*F. J. C.*

Phaedranassa Carmioli (*Bot. Mag.* tab. 8356).—Costa Rica. Nat. ord. *Amaryllidaceae*; tribe, *Amarylleae*. Herb, globose bulb, 2-3 inches wide; leaves, 1-3 appearing with flowers; scape, 2 feet high, perianth, narrowly funnel-shaped, flower two-thirds scarlet, upper third green with yellow margins.—*G. H.*

Phalaenopsis 'Hebe.' By G. T. Grignan (*Rev. Hort.*, July 1, 1911, pp. 304-6; coloured plate and several woodcuts).—The article is interesting as dealing with numerous successful hybrids but particularly so as illustrating pictorially the slow development of the seed after germination.—*C. T. D.*

Picea excelsa nidiformis. By E. Gienapp (*Oester. Gart. Zeit.* vol. vi. pt. 3, pp. 100-102; 1 fig.).—This dwarf pine is distinct in growth and appearance from all others. It is attractive as an isolated specimen on the lawn or as a member of a group of bushes.—*S. E. W.*

Plant Diseases, Remedies for. By K. Schechner (*Oester. Gart. Zeit.* vol. vi. pt. 2, pp. 64-72, and pt. 3, pp. 105-106).—Flowers of sulphur and Bordeaux mixture are good fungicides; the former should be applied when the sun shines. Bordeaux mixture is improved by the addition of sugar or molasses. A useful insecticide is prepared by dissolving 1½ lb. of soft soap in 10 gallons of hot water and adding ¾ pint of tobacco extract to the mixture. Diseased plants must be burnt. Seedlings must be carefully hardened off before planting out and be disinfected with sulphur or Bordeaux mixture. Plants which act as hosts to pests should be excluded from the garden.—*S. E. W.*

Plant Diseases, Resistance and Immunity in. By E. M. Freeman (*Phytopathology*, I, 4, pp. 109-115; Aug. 1911).—The author points out the variation in degrees of parasitism met with and the popular misconceptions with regard to disease resistance and immunity. Resistance is a property residing in the protoplasm, and

the whole problem of obtaining disease-resisting plants is complicated by many factors, not the least of which is the possible mutation of the disease-resisting organism.—*F. J. C.*

Plant Enemies in April and their Destruction. By M Schwartz (*Gartenflora*, vol. lx. pt. 8, pp. 164-170).—Wireworms and the larvæ of the cockchafer are destroyed by pouring carbon disulphide into holes bored in the ground, taking care to avoid the neighbourhood of young plants. Mice and voles are caught in traps. Apple trees are sprayed with the following mixture: Tobacco extract 3 parts, soft soap 6 parts dissolved in 30 parts of water, methylated spirits 5 parts, dilute with 150 parts of water. Cankered parts of the stem and branches are painted with linseed oil. Other plants may be sprayed with a mixture of tobacco extract and soft soap. The eggs of moths and butterflies are moistened with petroleum, and the nests of the tent caterpillar are destroyed by means of a brush dipped in oil. Spraying with a mixture of hellebore powder 1 lb., soft soap, 1½ lb. in 30 gallons of water prevents the ravages of caterpillars.—*S. E. W.*

Plants, Insect-catching. By M. J. Kinchel d'Herculais. (*Jour. Soc. Nat. Hort. Fr.* series iv. vol. xii. Feb. 1911, p. 77).—An account of certain South American and Central Asian plants bearing insect-catching flowers, with a description of the method in which the captures are effected. It is pointed out that with these plants fertilization by insects is obviously impossible, the visits of such insects being fatal to themselves and often injurious to the flower by reason of the dying struggles of the larger species.—*M. L. H.*

Pollination of Pear Blossoms. By E. E. Prescott (*Jour. Agr. Vict.* Jan. 1911, pp. 1-10).—Some varieties of pears are known to be self-sterile, sometimes permanently and sometimes only according to climate or locality, or under certain conditions. Victorian growers are familiar with this peculiarity in such pears as 'Winter Nélis,' 'Keiffer's Hybrid,' and 'Gansel's Bergamot.' Yet it is well known that in some localities and countries even these fruits are self-fertile; thus whilst 'Beurré Clairgeau,' 'Howell,' 'Souvenir du Congrès,' and 'Louise Bonne of Jersey' are considered to be self-sterile in America, in Victoria no trouble is found in the setting of fruit in these varieties of pear, and whilst 'Keiffer's Hybrid' is considered self-fertile in America, it is found in Victoria to be generally impossible to induce this tree to produce even a fair crop without the aid of cross-pollination; whilst very frequently it happens, that without artificial aid the trees of this variety never bear fruit at all.

It is probable that pollen may be more profuse and more active in some seasons than in others. In Victoria in 1910 the average time of pears in bloom from first to last was about nineteen days; while, in sheltered locations, the time is extended to from four to six days longer.

Where at present only one variety of pear is grown, or where the varieties do not concur in their time of blooming, it is necessary that

other varieties should be introduced. To replant occasional rows, or individual trees scattered through the pear area, would mean continued loss for several years. A quicker method is to work over, by grafting on the present trees, a scion of a second distinct variety working only one leader of the tree, grafting only every second or third tree, or occasional trees may be wholly worked over with the new kind.

As a temporary and immediate expedient, a jar containing water may be placed in the crown of the tree, when the tree is in flower, and in this some sprays of another variety of pear bloom may be placed, so that the second variety will be there for the action of the bees and other insects.—C. H. H.

Prunus and Pyrus Varieties. By E. Goerze (*Oester. Gart. Zeit.* vol. vi., pt. 3, pp. 87-90; pt. 4, pp. 137-142; pt. 5, pp. 180-186).—This is a list of the varieties of *Prunus* and *Pyrus* with their native habitat and date of introduction into Europe.—S. E. W.

Potatos, Degeneration of (*Jour. Soc. Nat. Hort. Fr.* series iv. vol. xii. Feb. 1911, p. 113).—A note on the rapid degeneration of imported varieties of potato in France. To combat this degeneration the constant raising of seedlings is said to be indispensable. A large proportion of such seedlings will be worthless, but among them will always be found some of value. Growers are also recommended to make careful choice of the tubers for reproduction and to select what proves to be a suitable variety for the conditions under which it is to be grown.—M. L. H.

Potato, Grafts on the. By Lucien Daniel (*Rev. Hort.*, Jan. 16, 1911, pp. 37-39; 3 illus.).—An interesting article on the results of grafting the tomato and nightshade (*Solanum nigrum*) on the potato, dealing particularly with the resulting formation of the tubers which, according to the author, conclusively proves that the old theory that with grafting both stock and scion absolutely maintain their characters and autonomy must be regarded as demolished, and not for the first time, each exercising an obvious effect upon the other.—C. T. D.

Potato Fertilizers. By W. H. Jordan and F. A. Sirrine (*U.S.A. Exp. Stn. New York, Bull.* 327, Dec. 1910).—Tests were made in three localities during four successive years to compare broadcast applications of commercial fertilizers on potato fields with applications in the row, and to compare organic nitrogen (from dried blood) with inorganic nitrogen (from nitrate of soda). The results were not very conclusive, drought interfering seriously with the tests.—A. P.

Potato Industry in Colorado. By C. L. Fitch and E. R. Bennett (*U.S.A. Exp. Stn. Colorado, Bull.* 175; November 1910; figs.).—An account of the cultivation of the potato under dry-farming conditions. The chief diseases affecting the plants in Colorado, and the injurious insects are also dealt with.—F. J. C.

Potato Motor Sprayer. By D. McAlpine (*Jour. Agr. Vict.* Feb. 1911, pp. 131, 132).—This consists of an engine, pump, and vat. The engine runs at 500 revolutions, which is considerably under any other motor, and has a pressure of 150 lb. to 300 lb. It is fitted with a governor which enables it to run at any desired speed, and has a magneto instead of a battery. The engine can be completely disconnected in five minutes and may be used for other work, such as chaff-cutting, pumping water, &c. The cost of the engine is £36. It is attached to two 2½-inch plungers, and the pump has a triple agitator. The droppers of the sprayer are on the stump-jump principle and have also guards to protect the sprayer. The vat is V-shaped to allow of thorough mixing of the ingredients. It holds eighty gallons, and when fully charged the entire weight is about 12 cwt. Cost of engine, pump, and sprayer, £65; and if mounted in a cart, £75.—*C. H. H.*

Potato, Productivity and Degeneracy of the Irish. By C. L. Fitch (*U.S.A. Exp. Stn. Colorado, Bull.* 176; November 1910; figs.).—It is remarked that after cultivation of the variety 'Pearl' (perhaps synonymous with 'Puritan'), a bud sport from 'Blue Victor,' for a few years under the conditions of the Experiment Station at Greeley, the tubers become deep-eyed, knotty, long, and unproductive because of conditions causing the plant to tend to seed-bearing. Early dryness, cultivation close to the plant and deep so that roots are cut, and disease, are said to be the factors producing the tendency to seed, and the tuber production is in inverse proportion to this tendency. The most degenerate tubers are borne by the plants having fully developed pollen; those on plants in which the pistil only is well developed are intermediate in form and yield between the best borne on plants whose buds do not even swell, and the worst.—*F. J. C.*

Potato-seed Questions in 1909. By T. C. Johnson (*U.S.A. Exp. Stn. Virginia, Bull.* 3, Sept. 30, 1909).—The question of importing seed potatoes into Tidewater, Virginia, where the crop is an important one, is here considered. Home-grown seed since the introduction of the latest varieties has ceased to be used, and the most easily available imported seed has not proved satisfactory so far. A large percentage of the loss from this cause is said, however, to be due to improper handling of the seed potatoes during transit and storage; and in ordering quality of seed must be insisted upon above everything else. These points being seen to, the writer thinks that there is no real reason why northern-grown seed should not succeed perfectly well in the south.—*M. L. H.*

Primula Maximowiczii (*Bot. Mag.* tab. 8363).—Northern China. Family *Primulaceae*; tribe, *Primuleae*. Herb, glabrous, leaves oblong-elliptic; 1½-6 inches long; scape, 8-12 inches high; flowers, red, on several-tiered umbel.—*G. H.*

Prostanthera pulchella (*Bot. Mag.* tab. 8379). Australia. Family *Labiatae*; tribe, *Prostanthereae*. Under-shrub, 1½ foot high;

leaves nearly sessile, linear, puberulous; flowers in lax 10 to 13-flowered racemes; corolla, sub-rotate, faintly two-lipped, lilac, $\frac{3}{4}$ inch across.—*G. H.*

Prunus microcarpa (*Bot. Mag* tab. 8360).—Orient. Family *Rosaceae*; tribe, *Prunaceae*. Shrub, often dwarf, at most 7 feet high; leaves elliptical, $\frac{3}{4}$ -1 $\frac{1}{2}$ inch long; flowers, very few on lateral twigs; pink, $\frac{1}{2}$ inch across.—*G. H.*

Pseuderanthemum malaccense (*Bot. Mag* tab. 8368).—Malay Peninsula. Family *Acanthaceae*; tribe, *Justicieae*. Shrub, 3-5 feet high; leaves, lanceolate, 3-5 inches long; inflorescence, $\frac{1}{2}$ -2 inches long; corolla hypocrateriform, tube, 1-1 $\frac{1}{2}$ inch long, pale violet, said to be speckled with red; anthers purple.—*G. H.*

Pteronia incana (*Bot. Mag* tab. 8380).—South Africa. Family *Compositae*; tribe, *Asteroideae*. Shrub, 3-4 feet high, much branched; leaves, linear; heads, numerous, about 8-flowered, yellow.—*G. H.*

Raspberry, A New (*Jour. Soc. Nat. Hort. Fr.* series iv. vol. xii. Jan. 1911, p. 73).—A new raspberry 'Souvenir de Desirée Bruneau' which has been put on the market by M. Nombrot Bruneau is described, and recommended as an earlier and later bearer than any other at present in cultivation.—*M. L. H.*

Rehmannia hybride à grande fleur rose. By S. Mottet (*Rev. Hort.*, September 1, 1911, pp. 398-400; one coloured plate and one woodcut).—The coloured plate represents a very handsome inflorescence of large flowers, pink, spotted, and rayed delicately with rich red. It appears to be a cross between *R. Henryi* and *R. angulata* by M. Vilmorin. It is barren as regards the pollen, but amenable to crossing with pollen of other forms, the seed, &c., produced germinating freely.—*C. T. D.*

Rhododendron, Large White. By F. Ledien (*Gartenflora*, vol. lx. pt. 1, pp. 2-3; coloured plate).—This rhododendron is frequently known as *R. argenteum*. It is to be preferred to *R. Falconeri*, as there is no difficulty in keeping the foliage in a healthy condition.

S. E. W.

Rhododendron lacteum (*Bot. Mag* tab. 8372).—Western China. Family, *Ericaceae*; tribe, *Rhodoreae*. Tree; leaves clustered, 6-8 inches long; corymbs, dense; flowers, white with a blood-red patch within the tube, 2-2 $\frac{1}{2}$ inches wide.—*G. H.*

Rhododendron Smirnowi and **R. Ungerni.** By F. Reuter-sheim (*Gartenflora*, vol. lx. pt. 3, pp. 61-62).—Where very hardy rhododendrons are required, *R. Smirnowi* and *R. Ungerni* should be planted.—*S. E. W.*

Rhododendron sutchuenense (*Bot. Mag.* tab. 8362).—Central China. Family, *Ericaceae*; tribe, *Rhodoreae*. Shrub, 8-10 feet high, flowering when 2 feet in height; leaves, 3-10 inches long; flowers densely corymbose, 3 inches across, corolla rose-coloured.—*G. H.*

Rose, 'Mme. Jules Grolez.' By V. Jablanczy (*Oester. Gart. Zeit.* vol. v. pt. 12, pp. 471-2).—This rose deserves to be more generally grown. Its only weak point is that it has but slight scent. The foliage, bud, and flower leave nothing to be desired. It is seen to best advantage in low groups.—*S. E. W.*

Roses, Malformed. By K. Josefsky (*Oester. Gart. Zeit.* vol. vi. pt. 3, pp. 106-110).—A sudden fall of temperature checks the development of the buds, preventing them from opening or producing malformed blossoms. The following roses are peculiarly susceptible: 'Auguste Mie,' 'Mme. Moser,' 'Mme. Damaizin,' 'Mme. Boll,' 'La Reine Hermosa,' 'Jules Margottin,' 'James Bougault,' 'Robert Lebaudy,' 'Clio,' 'Marie Guillot,' 'Etoile de Lyon,' and 'Clotilde Soupert.'—*S. E. W.*

Roses, Novelties (*Oester. Gart. Zeit.* vol. vi. pt. 2, p. 73).—Two new hybrid teas are well worth growing; 'Reine Mère d'Italie' has fine foliage, oval buds on long stiff stalks. The colour of the bud is apricot, the flower resembles 'Soleil d'Or' in colour. 'Mrs. Edward Powel' is a strong grower bearing purple flowers with scarlet markings.

S. E. W.

Rusts, South African Cereal. By J. B. Pole Evans (*Jour. Agr. Sci.* vol. iv. pt. 1, pp. 95-104).—Four rust fungi, *Puccinia graminis* Pers., *P. triticina* Eriks., *P. coronifera* Klebahn, *P. dispersa* Eriks., attack various cereals in S. Africa, the first being the worst. The aecidiospore form does not occur, and so far the teleutospores have not been found capable of germination. Inoculation experiments have revealed some curious results, *e.g.* *P. graminis* attacks rye late in the season, and always on the stalks, not on the ears. Repeated inoculation of the leaves has failed to induce infection thereon. The form which occurs on wheat and barley fails to attack oats and rye, and it will not attack barley during the winter, although in summer barley is readily attacked. The form on oats will not attack wheat or barley. It is found that cereals which are rust-resistant in America, Australia, England, and India do not retain this quality in South Africa, or, at any rate, not through the whole area of cultivation there. The author crossed resistant varieties with rusted ones and found the hybrids much more susceptible to rust than the parents were. The spores from the more vigorous parasite on the hybrids proved capable of infecting both parents in a very virulent fashion, the hybrids thus acting as "bridging" varieties. It would thus appear that the infection of the "resistant" varieties in South Africa is, at least to some extent, owing to a change in the constitution of the fungus, and not wholly,

if at all, on account of a change in the physiological reactions of the host. The capability of readily varying infection powers on the part of the host is of great importance in connexion with the question of breeding "resistant" varieties.—*F. J. C.*

Saltbushes, The Ornamental Value of. By David Griffiths (*U.S.A. Dep. Agr., Bur. Pl. Ind., Circ. 69, Dec. 1910; figs.*).—In the regions of Western North America, where drought and the alkaline nature of the soil make the cultivation of most foreign ornamental shrubs difficult, if not impossible, the native species of saltbushes, *Atriplex*, may be usefully employed in the formation of hedges. The colour of the foliage, a bold grey-green, is not altogether a disadvantage, as it does not show dust, and makes a good background for other warmer-coloured plants. The *Atriplex* is a rapid grower, and makes an impenetrable hedge; the different species thrive, some in cold, some in heat, and all will withstand considerable shortness of moisture and are indifferent to alkali in the soil. Various species of the family are described and figured.—*M. L. H.*

Saussurea Veitchiana (*Bot. Mag. tab. 8381*). Central China. Family, *Compositae*; tribe, *Cynaroideae*. Herb, 2-3 feet high; leaves, 10 inches long; heads, ovoid, 1 inch long, dark purple petals and anthers.—*G. H.*

Schizanthus, Anthracnose of. By C. N. Jensen and V. B. Stewart (*Phytopathology*, I, 4, pp. 120-125; Aug. 1911; fig.).—The disease is characterized by the appearance of water-soaked and finally sunken areas on the stems which are black with the spores of the fungus. The affected part dies and the portion above wilts. Brown spots are also produced on the foliage. The germination of the spores is described, and the results of inoculation experiments. The fungus proved to be a new one, and is described under the name of *Colletotrichum schizanthi*. Inoculations of other solanaceous plants proved unsuccessful.—*F. J. C.*

Slugs and Snails. By Alfred J. Ewart (*Jour. Agr. Vict. Dec. 1910, pp. 807, 808*).—Great damage is done by these creatures, especially on moist, heavy ground among seedlings, specially choosing young lettuce, tomatos, turnips, cabbages, cauliflowers, and even carrots, whilst peas, broad beans, beet, parsnips, and parsley are usually left untouched. Neither lime nor wood ashes ward off their attacks for more than a day or two, and a heavy shower renders them immediately useless. The method recommended is to add one or two large tea-cups of phenyl to ten or twenty cups of water, and use the mixture to moisten a bucket of sawdust. The sawdust is spread round the plants to be protected; its effect persists after rain, and lasts a considerable time. During wet weather a stronger solution can be employed. No injurious action is exerted on the plants nor upon the soil, as the sawdust slowly works into it. The effect of depriving the animals of their food

is to cause a marked decrease in their numbers, quite apart from any poisonous action. The labour and cost involved are exceedingly small—a bag of sawdust at 1s., allowing 6d. for carriage, and 1s. worth of phenyl at 3s. 6d. the gallon will be sufficient for a fairly large garden.

C. H. H.

Smut, Stinking, Prevention of. By F. Ditzell and R. G. Downing (*Agr. Gaz. N.S.W.* vol. xxii. pt. 4, pp. 341-357).—Comparative experiments on the relative values of different preventives of bunt showed that copper sulphate solution, with or without the addition of salt, fergusine and Bordeaux paste were equally efficient as destroyers of bunt, but that fergusine is the only agent which does not impair the germination of the wheat. Formalin is very uncertain in its action. Scalescide and lysol are practically useless.—S. E. W.

Smut, Treatment for. By G. L. Sutton (*Agr. Gaz. N.S.W.* vol. xxii. pt. 3, pp. 189-195; 3 figs.).—Soak the seed in a 2 per cent. solution of copper sulphate for five minutes, drain, then dip the wet seed in lime-water for three minutes. Dry before planting.—S. E. W.

Soil, Manurial requirements of. By F. Ledien (*Gartenflora*, vol. ix. pt. 2, pp. 25, 26, and pt. 5, pp. 94-106).—The amount of nitrogen in the soil is increased by the agency of azotobacteria; their activity is increased by the presence of phosphates and lime. By digging in fallen leaves, the nitrogen in the soil is further increased. The action of the Leguminosae on the soil is well known.

Orchards require the following treatment annually: for 120 square yards 6 lb. basic slag, 20 lb. kainit, 30 lb. chalk well mixed in the soil. In April 3 lb. superphosphate, 3 lb. sulphate of potash, and 6 lb. nitrate of soda divided into two doses, or 5 lb. sulphate of ammonia in one dose. Humus is provided by using stable manure. In the cultivation of vegetables, farmyard manure is the main fertilizer; it should be supplemented by 8 lb. sulphate of potash, 8 lb. of superphosphate, and 16 lb. nitrate of soda to each 120 square yards. The latter is given as a top dressing or better as a three per cent. solution in four separate doses.—S. E. W.

Soy-Bean, History and Varieties of. By C. V. Piper and W. J. Morse (*U.S. A. Dep. Agr., Bur. Pl. Ind., Bull.* 197, Dec. 1910; plates).—The soy-bean appears to have been first made known to Europeans by Kaempfer, who discovered it in Japan about 1690. Linnaeus first described it in a work on the flora of Ceylon, and later formally named it *Dolichos Soya*, and gave its habitat as India. What this Indian or Ceylon plant of his may have been is not now clear, as his description does not fit any of the varieties at present found in those countries. Other early botanists describe species which are now difficult to identify. Under existing botanical rules the present cultivated plant is known as *Glycine hispida*, and its nearest relative as *Glycine Soya*, though on the whole it seems probable that there is but

one botanical species which has been profoundly modified by cultivation. This bulletin describes the different groups of soy-bean at present in cultivation and gives a list of several hundred varieties of which the seed has been imported into North America, with a description of the characters of each as developed at different experimental stations in the United States.—*M. L. H.*

Spathoglottis plicata. By F. Ledien (*Orchis*, vol. v. pt. iii., p. 40; 1 plate).—This well known orchid is depicted in a coloured plate.—*S. E. W.*

Spinach Troubles at Norfolk, Virginia. L. L. Harter (*U.S.A. Exp. Stn. Virginia*, Bull. 4, Aug. 31, 1910; plates).—The spinach crop in the market-gardening districts of Norfolk, Va., has been getting shorter for some years, and this bulletin sets forth the results of investigations as to the causes of this gradual failure. The seasons have been very dry, but it is said not to have been drought only from which the crop has suffered. There were three diseases affecting the spinach in Tidewater, Virginia, leaf-spot, mildew, and malnutrition. It is with the last only that this bulletin is concerned, and the writer attributes it to the excessive use of chemical manures in the region, and the consequent disappearance of humus and accumulation of acid in the soil. Norfolk soils are naturally deficient in organic matter, and the practice of applying nothing but chemical fertilizers is therefore specially inadvisable in that region. The reasons why humus in the soil is beneficial are pointed out, and its possible sources of supply, horse-manure and green manure, are mentioned, and the best method of their application described. Crop rotation is also said to be indispensable, although the choice of crops in such a rotation depends to a great extent on the economic and natural peculiarities of each district, and it is unfortunate that there is no deep-rooting green crop suitable to the conditions in the locality.

The functions of micro-organisms in the soil and the relation of lime to micro-organisms and humus in the soil are also discussed.

M. L. H.

Spring Frosts, Damage to Plants. By F. Rochau (*Gartenflora*, vol. lx. pt. v, pp. 116-120).—Late frosts damage land plants by driving the water out of the cells into the intercellular spaces, where it freezes. The cell contents are concentrated and a change in the constitution of protoplasm takes place. If the plant is very slowly thawed the cells again take up water, and the protoplasm may continue to live in favourable cases, but if there is a sudden rise of temperature the roots resume their activity, the altered cells are unable to circulate the water supplied to them, and the plant dies.—*S. E. W.*

Sterility in Fruit Trees. By E. Wallis (*Jour. Agr. Vict.* Jan. 1911, pp. 10-19).—In Victoria, such kinds as 'Keiffer's Hybrid' and 'Winter Nélis' pears, 'Northern Spy' apple, 'Coe's Golden

Drop' plum, and 'Early Purple Guigne' cherry are notable as very shy, or, in some cases, non-bearers, although their flowers are perfect. "Shy" or "non" bearers are usually those growing uprightly and vigorously as 'Kieffer's Hybrid' pear and 'Northern Spy' apple, or those producing an over-abundant number of spurs, and consequent amount of blossom, as in the case of the 'Winter Nélis' pear, 'Coe's Golden Drop' plum, and 'Early Purple Guigne' cherry; upright vigorous growth is opposed to fruitfulness, and over-production of pollen may be a predisposing cause of sterility by weakening the pollen to the extent that it becomes impotent upon its own pistils. The causes of sterility may be therefore summarized as: (1) Imperfection of structural arrangement of blossom; (2) unfruitful habit of growth and over-production of fruit spurs and blossom; (3) natural impotency of pollen; (4) working by buds or grafts taken from sterile or partly sterile trees.

If the blossom of a flower is imperfect in structure, this cannot be remedied, and the stem, if sound, should be worked over with a variety of good repute.

In regard to unfruitful habit of growth and over-production of spurs, good results may sometimes be obtained by adopting proper methods of pruning of wood and spurs. With 'Winter Nélis' and 'Gansel's Bergamot,' thinning out the spurs caused the fruit to set.

The 'Kieffer' responds readily to cross-fertilization from other varieties such as 'Harrington's Victoria,' 'Le Conte,' and 'Citron des Carmes,' also 'Poire de Bernays,' 'Monchallard,' and 'Howell.' Tins containing water were placed in the centre of the trees with three limbs of blossom of another variety, having their basal ends in water, with the result that the trees were very fruitful, and the fruit did not drop.

Spur pruning, though making certain pears set their fruit better, does not benefit the cherry or plum, but the 'Early Guigne' cherry, which flowers early, is found to bear regularly where alternated with 'Black Biggareau' or 'Biggareau de Mezel,' 'Burgdorf's Seedling,' and 'Chapman.' The 'Biggareau de Mezel' and 'Guigne,' both shy bearers, are mutually benefited by being planted close together, whilst 'Pond's Seedling' plum is found to have a beneficial influence upon the setting of fruit of 'Coe's Golden Drop.' Next follow lists of the dates of blooming made in seven districts at the request of the Chief Inspector of Orchards of 91 varieties of apple, 57 of pear, 33 of plum, 22 of peach, 25 of cherry.—C. H. H.

Surface Caterpillars, Destruction of Cut Worm or. By C. French and F. de Castella (*Jour. of Agr., Vict.*; July, pp. 455-461).—The two methods adopted in Australia are: (1) Spraying with lead arsenate in suspension in water. (2) The use of baits in proximity to the young plants. Thus poisoned bran is made in the following proportions: one part by weight of arsenic, one of sugar, and six of bran, to which is added sufficient water to make a wet mash. This mixture is

usually made in a washtub or half-barrel, one of these is filled three-fourths full with dry bran, and to this is added about 5 lb. of arsenic which is thoroughly stirred through the bran with a spade or shovel; 5 lb. of sugar are next thrown into a pail, which is then filled with water, and the sugar stirred until it is dissolved, when the sugar-water is added to the bran and arsenic, and the three well stirred. More water is added and the stirring continued until every portion of the mash becomes thoroughly saturated. The mixture should be placed around and through the crop, or at the foot of the tree, plant, or shrub infested, dropping it into the shade when this can be done. This preparation should be kept out of the way of children and domestic animals.

Another method is to dip bundles of any weed or vegetable into a strong mixture of Paris green 1 oz. to a bucket of water, and place these between the rows of the infested crop. The caterpillars eat the poisoned plants, bury themselves and die.—*C. H. H.*

Tea. By A. E. Erlbeck (*Oester. Gart. Zeit.* vol. vi. pt. i., pp. 18-22).—Tea plants are manured with oil cake in China and with dried fish and crushed mustard seed in Japan. The cultivation of tea is no longer confined to China, India and Ceylon, but is carried on successfully in Japan, Java, Natal, and the Caucasus. Probably 6,000,000,000 bushes are required to provide the tea consumed annually.—*S. E. W.*

Thrixspermum. By R. Schlechter (*Orchis*, vol. v. pt. iii., pp. 46-48, and pt. iv., pp. 54-58).—The genus *Thrixspermum* differs from *Sarcochilus* by having a fixed labellum. The flowers appear one at a time and only last a day. Members of this family are distributed throughout the monsoon region, they are found at sea level and in mountainous districts at 3,000 feet altitude. They are frequently found in flower, growing on young branches of trees. The genus is divided into three sections, *Orsidice*, *Dendrocolla*, and *Katocolla*. In the last class the plants hang down and bear few flowers.—*S. E. W.*

Tobacco, Cigar-leaf Production of, in Pennsylvania. By W. Frear and E. K. Hibshman (*U.S.A. Dep. Agr., Farmers' Bull.* 416, Oct. 18, 1910; figs.).—A detailed account of the tobacco-growing industry in the State of Pennsylvania, the third largest grower of the crop among the States of N. America, as regards acreage, yield, and value. The climate of Pennsylvania exercises a very marked influence on the character of the plant and is dominant over that of soil and heredity. All imported varieties, no matter what their origin, soon develop the characteristic Pennsylvanian long broad leaf and mild flavour and aroma. The bulletin describes all the processes of raising, transplanting, cultivating, harvesting, curing, and handling, and is fully illustrated.—*M. L. H.*

Trees, Care of Historic or Remarkable (*Jour. Soc. Nat. Hort. Fr.*, ser. iv., vol. xi. p. 586; Oct. 1910).—Steps are being taken by

the Department of Woods and Forests in France to protect historic and remarkable trees. Circulars are being sent out to all local forest agents in France and Algeria pointing out the value, both on æsthetic and sentimental grounds, and as bringing visitors into out-of-the-way places which they would not otherwise visit, of trees either remarkable or beautiful in themselves or possessing historic or romantic associations. These agents are called upon to register all such trees which may be found in their district, and to record what it is which makes each individual remarkable. In future it is to be impossible to destroy one of these registered trees without a special permit from the Department, which will only be given on very sufficient grounds.—*M. L. H.*

Tristellateia australis (*Bot. Mag.* tab. 8334).—Family, *Malpighiaceae*; tribe *Hireae*. Malaya and Australasia. Shrub, climbing; leaves ovate, 2-4 inches long; racemes 2-6 inches long, 12-16 flowered; corolla $1\frac{1}{4}$ inch across, yellow; stamens 10; filament at first yellow, then deep red.—*G. H.*

Truck Crop Investigations. By F. H. Chittenden, Sc.D. (*U.S.A. Exp. Stn., Virginia, Bull.* 2; Sept. 1909; 1 plate, 11 figs.).—This bulletin describes, among other items, certain pests peculiar to the cabbage crop, including the cabbage aphid (*Aphis brassicae* Linn.), the imported cabbage worm (*Pontia rapae* L.), and the cabbage looper (*Autographa brassicae* Riley), with remedies for their prevention and destruction.

Kerosene emulsion prepared by combining 2 gall. kerosene, 1 lb. hard whale-oil soap, or 1 quart of soft soap, with 1 gall. of hot water. The whole diluted with 10 to 20 parts water, applied in a mist-like spray, is the most efficacious remedy for aphid. With regard to the cabbage worm, the best remedy is an arsenical wash, either Paris green or arsenate of lead, applied when the plants are first set out, with other applications as required until the heads are about two-thirds formed, and even later, as the poison disappears from the plants almost completely in three or four weeks.—*V. G. J.*

Tunisia, Fruit-growing in. By M. L. Guiblochon (*Jour. Soc. Nat. Hort. Fr.*, ser. iv., vol. xi. p. 505; Aug. 1910).—An account of the present state of the fruit-growing industry in Tunisia. The colony contains regions with varying climates, suited respectively to the cultivation of all the fruit-trees known to temperate countries and of several belonging only to the Tropics. Statistics of production and export are given here, and with the growth of the native and European populations of the Colony the figures inspire great hopes for the agricultural and horticultural future of the country.—*M. L. H.*

Turnips, Experiments in Crossing. By J. H. Wilson (*Trans. High. and Agric. Soc. Scotland*, p. 18-31, 8 figs.; 1911.).—Observations on crosses between purple-top swede and yellow turnip. The yield of seed was small, and the seed-capsules irregularly filled. On

growing the seed a mixed progeny was obtained. The flowers on the hybrids were intermediate, and there was much irregularity in fruiting, ripe capsules and green ones occurring on plants still in flower. Further observations on the growth of later generations are given. During the experiments a nodular disease on the tubers (not "finger and toe") was observed and is described. An accidental cross with curled kale occurred and some of the hybrids are illustrated.—*W. G. S.*

Twisted Tree Trunks. By R. Goethe (*Gartenflora*, vol. ix. pt. i., pp. 17-18).—Two photographs depict twisted trunks. The author is of opinion that the study of this subject will aid in the identification of different varieties of fruit trees.—*S. E. W.*

Urceocharis × edentata (*Bot. Mag.*, tab. 8359).—Peru. Family, *Amaryllidaceae*; tribe *Amarylleae*. Hybrid between *Urceolina* sp. and *Eucharis* sp. Leaf solitary, elliptic-oblong, 6 inches long; scape, 8 inches long, 4-5-flowered; perianth white with pale-yellow tips, campanulate, basal tube pale yellow, 7 inches; limb 1½ inch long, 2 inches across.—*G. H.*

Varieties, Horticultural. The Genesis of, and Mendel's Law. By G. Molon (*Pom. Franç.*, Supplement to; 1910; 32 pp.).—The well-known Pomologist of Milan gives a long account of the various theories held by Van Mons, Poiteau, Gallisio, &c., upon the origin of horticultural varieties, and concludes with a statement of Mendel's law, illustrated by diagrams. No original work is brought forward.
E. A. Bd.

Varieties, New, to be obtained by Mutilation (*Jour. Soc. Nat. Hort. Fr.*, ser. iv., vol. xii. May 1911, p. 231).—An account has already been published of a curious case in which in consequence of serious mutilation of a bed of Zinnias (see *Jour. R.H.S.* xxxvi. p. 848) the later flowers all appeared not only different in colour but actually altered in structure. M. Paul Becquerel has been making further experiments to see whether by means of mutilation fixed new varieties may be obtained. He is now of opinion that sports produced in such a manner cannot be fixed and are really only a reversion to the character of some earlier source of cross-fertilization. Mutilation may, therefore, be useful as a means of determining questions of parentage.—
M. L. H.

Vegetable-growing in Oregon. Arthur G. B. Bouquet (*U.S.A. Agr. Exp. Stn., Oregon, Bull.* 109, Oct. 1910; plates).—A preliminary report on vegetable culture in Oregon, where it is rapidly spreading. The report includes a short account of the conditions of this State as they affect the industry, and suggestions as to suitable methods of raising some of the more important vegetable crops.—*M. L. H.*

Vegetation of Africa. By A. Engler (*Die Vegetation der Erde*, pt. ix., 1908).—The history of botanical exploration in Africa still awaits its chronicler, but when it is written it will be a romance of endurance and courage under great difficulties. Fifty years ago little was known of the continent as a whole, although a considerable number of plants had found their way into European herbaria, and even into our gardens and conservatories from the coastal regions—the Cape district of South Africa, the Atlas and other parts of Northern Africa, including Egypt, Nubia, and Abyssinia. Little, however, was known of tropical Africa except Senegambia and some other parts of the coast, especially the west. The scramble for African territory by the European nations towards the close of last century opened up a new chapter in botanical investigation, as each nation with more or less zeal encouraged exploration of its new domains. The Germans, particularly, made great advances in botanical exploration, no doubt spurred on by Dr. Engler, the author of this memoir, and Director of the great Imperial Botanic Garden and Herbarium near Berlin. Our own nation has not altogether neglected investigating the resources of its territories, and descriptive works like Sir H. Johnston's *Uganda* have added much to our geographical literature. But the flora and vegetation *per se* have attracted only a limited number of botanists, amongst others G. F. Scott Elliot. This cannot be because our possessions are less suitable, for in most cases they adjoin the German colonies, and are more extensive. Engler remarks that, had one set out to select centres for the scientific investigation of Africa, one could hardly have found better situations than the Cameroons and Togo on the West Coast, German East Africa, and the "greatly under-estimated" German South-west Africa.

During these recent years, the efforts of botanical explorers, aided by resident officials, have so greatly added to the known plants of Africa, that the early volumes of the "*Flora of Tropical Africa*," begun at Kew in 1868, contain only about half the species now known. Even the later work on East Africa (1895) prepared in Berlin, includes only about two-thirds of the number of plants which could now be recorded. Dr. Engler has undertaken his memoir on the ground of this recent progress, and, although the available information is still somewhat fragmentary, enough is known to warrant an attempt to survey the vegetation. The proposed memoir is to consist of five volumes:—

Vol. i.—General survey of the vegetation of Africa as a whole; the conditions of its existence, including geographical, geological, climatic and soil conditions; the Flora, its regions and constituents (see above).

Vols. ii. iii. iv.—An illustrated handbook of the natural orders, genera, and important species.

Vol. v.—Description of the vegetation-formations and the floral provinces of tropical Africa, to include a history of botanical exploration, and the history of the development of the Flora of Africa.

The issue of Volume ii. as the first one of the projected series thus

becomes intelligible; it is the first part of the illustrated handbook of the more characteristic species which go to the making of the vegetation of Africa. The volume includes the Ferns and fern-allies, the Gymnosperms and the Monocotyledons. The promise of numerous illustrations is amply fulfilled—330 illustrations in 450 pages. Many of these are habitat-illustrations showing plants in their natural surroundings, while the majority are morphological studies of the organs of characteristic plants. The concept underlying this purely descriptive part is to bring into prominence species which contribute to the physiognomy of the vegetation. As the work is carried out on strictly phytogeographical lines, it is extremely useful for the botanist, but less interesting to the geographer than the subjects to be dealt with in Volumes I. and V. The Grasses occupy a considerable part of the volumes (170 pp.), because few families of plants play so important a part in Africa, and because they are useful in delimiting the plant formations. In this respect Africa shows more similarity to America than to tropical Asia. The species are arranged into groups—coast grasses, grass-steppe, scrub, etc., as these occur in various climatic regions of Africa. The principal cereals are: Durra (*Andropogon Sorghum*) with many varieties, some used as corn, others for the preparation of fermented liquors; other important millets are furnished by *Pennisetum*; Rice is cultivated especially in East Africa, and occurs in several wild forms; Korakan or Dagussa (*Eleusine coracana*) is grown in East Africa and in Abyssinia up to 2400 metres altitude, where Tef (*Eragrostis abyssinica*) is also cultivated, and wheat and barley are important crops at higher elevations; maize, introduced from tropical America, has rapidly become a valued cereal; sugar is obtained from the sugar cane (*Saccharum*) as well as locally in some districts from other Grasses, e.g. *Panicum Burgu*, a plant of the floodlands of Western Soudan and the Niger. The Banana (*Musa*), another important economic order for tropical Africa, the Liliaceæ, and other showy-flowered orders allied to it, are also included in this volume. The Orchids and Palms, also of general interest, are neither of them so strongly represented in Africa as in the Asiatic monsoon-region and in tropical America. It will thus be seen that we have before us a monumental work containing a fund of information essential to those interested in the botany of Africa. One cannot lay it aside without observing that the price, all things considered, is low, a result of financial assistance from the German Colonial Office.—W. G. S.

Vegetation of Africa. By A. Engler (*Die Vegetation der Erde*, pt. ix., 1910).—This volume of over 1000 pages has been greatly enhanced in value by 400 figures, and a number of plates and maps, the funds for which were provided by the Colonial Office at Berlin.

It contains a general survey, especially of the tropical vegetation of Africa, introductory to four other volumes dealing mainly with floristic and systematic details—one of these is noticed above. The general orientation is of considerable length (pp. 1-866), and takes up

in succession the different countries, particularly the coastal ones. The translation of Schimper's *Plant-Geography* has already made available to the English reader the general features of the more accessible parts of Africa; the present work is, however, much more detailed, hence on the whole adapted rather to the specialist than to the general reader.

The main features of the vegetation of Spain and other countries on the European side of the Mediterranean are found again in North Africa, better developed, however, because cultivation and settlement of the land have not proceeded so far. From Morocco and the cultivated "Tell" lands of Algeria, the reader is taken over the "alfa-grass" of the inland plateau to the slopes and summits of the Atlas Mountains, and into the Sahara, which is by no means so monotonous in its vegetation as is generally supposed. Eastwards, the better-known lands of Egypt and the Nile, Abyssinia, and Somaliland are dealt with. From the Galla Highlands and the Massai Highlands, British East Africa is reached, and although this receives a shorter notice than might be desired, the deficiency can be made up from works of British explorers. German East Africa receives more attention (120 pp.), and the provision of a coloured vegetation map enables the reader to follow the somewhat intricate zonation from the sea-coast to the higher mountains. The coast is mainly a white strand with xerophytic plants, backed by a green bush-scrub broken by plantations of cocoanut and mango. The creeks and estuaries with oozy mud are distinguished by the mangrove swamp. The coastal bush-forest is rich and evergreen, a reflex of the heavy tropical rainfall during the long rainy season of the south-west monsoon and the lesser rains in October and November. Behind this coastal screen of forest the rainy season becomes shorter, and the great steppes and scrubs of the interior begin. The rich fauna is probably more familiar than the somewhat meagre flora, but Dr. Engler has prepared the way for that economic development of East Africa which is to come, by a classification of the various forms of steppe met with. The more arid are salt-steppes, and those with fleshy, thorny succulents; less dry are the thorn-bush steppes consisting either of evergreen or deciduous scrub. Other forms of steppe are "park-like" with trees standing isolated over a poor ground-vegetation on the drier soils, or over a grassy sward in moister conditions. The tropical rain-forest, which in West Africa begins near the coast and follows rivers like the Congo far inland, is in East Africa limited to the tropical valleys of the larger mountain regions such as Usambara and Kilimanjaro. On the mountains the chief zones are bush-scrub or grass-land above the rain-forest, then a "cloud-forest" which follows the occurrence at higher altitudes of a zone of low night-temperatures with much cloud. The summit zones are alpine in character, with giant *Senecio* and *Lobelia* in the lower sub-alpine.

The next groups of countries dealt with are those round Tanganyika and Nyassa, and eastwards to the coast, then Rhodesia and South

Africa. The arid character of German South-West Africa is shown by a vegetation map, and other coloured maps bring out in strong contrast the rich forest areas of the Kamerun and Togo. The description of the West Coast is completed by a short sketch on the vegetation of the islands, Cape Verde, the Canaries, and Madeira.

The geographical part of the work (pp. 871-966) gives details of temperature and rainfall in the different regions of Africa, and short summaries of the altitudinal zones, and of the ecological plant formations. For floristic purposes, the continent is divided into four areas: (a) the Mediterranean, (b) the deserts of the northern African-Indian area, (c) the forest and steppe area, and (d) the south-western Cape area.

While a work of this size requires some application in reading it, the wealth of illustration is of great assistance. Most of the figures are purely botanical, illustrating the features of characteristic species, but there is also a large proportion of landscapes or habitat illustrations, reproduced from photographs.—W. G. S.

Vegetation of the Balkan States. The. By Dr. Lujo Adamović (*Die Vegetation der Erde*, pt. xi. 1909).—The countries adjoining the Balkans have played a conspicuous part in the political history of Europe, but their physical features and natural history are not so well known. Our knowledge of south-eastern Europe has been greatly enlarged by the enterprise of the editors of *Die Vegetation der Erde*, who have been fortunate in securing important memoirs from eminent botanists in that region. A monograph on the vegetation of the Carpathians by Dr. Pax was completed recently, and in 1901 there was issued Ritter von Beck's work on the vegetation of the Illyrian countries, including South Croatia, Dalmatia, Bosnia, Herzegovina, Montenegro, Northern Albania, and Servia. The present volume deals with the area lying between von Beck's "Illyria" to the west, and Pax's "Carpathians" to the north; it includes Servia, Bulgaria, Eastern Roumelia, and the northern parts of Thrace, Macedonia, and Eastern Albania, that is, approximately, the former Roman province of Moesia.

The author, Professor Lujo Adamović, lecturer on Plant-Geography in the University of Vienna, has worked the area systematically since 1890, and he is the author of nearly fifty papers on its botany. In the historical review one sees that many botanists have explored these lands, but most of all Josef Pančić. This botanist practically discovered the vegetation of these Balkan countries, and was considerably assisted by King Milan, himself a good botanist, who showed his interest by establishing the present botanic garden at Belgrade. It is noteworthy that the present volume is dedicated to Ferdinand I. of Bulgaria, "through whose generosity the printing of so many costly maps was made possible." Of maps there is an excellent series, coloured to show the vegetation. Two show the whole area (scale 1: 750,000), and they will be found useful as physical and topographical

maps of this complex region, where most ordinary atlases are quite inadequate. Four coloured maps on a larger scale show the distribution of vegetation on the Rila Planina, and other mountain groups. The memoir is also well illustrated with about seventy excellent reproductions from photographs, which show typical plant habitats.

The memoir (565 pp.) is divided into four sections:—physical geography, the vegetation and its formations, the present distribution of the flora, and its development since past times.

The Balkan-lands are much cut up by mountains which enclose greater or less expanses of plain, and these physical features bear directly on the present distribution of the vegetation. The Transylvanian Alps of the Carpathian system cross the Danube at the Iron Gate, and become part of the complex mountain system of Servia, which is intersected by the valleys of the Drina, the Morava, and numerous branches extending far south into the Dinaric Alps. From this mountain complex the Balkans and Rhodope Mountains ultimately emerge as parallel ranges to the east. The Balkans form the southern boundary of the great Danube plain, and gradually descend from 6600 feet on the Stara Planina between Servia and Bulgaria, to low hills near the Black Sea. The Rhodope Mountains include in the west the Rila Planina, the most imposing mountain group of the Balkan Peninsula, with Mt. Muss Alla rising to 10,000 feet; they form the boundary between Bulgaria and the countries to the south, and continue eastwards towards Adrianople, being still represented in a hilly country extending to the Black Sea. The larger river-valleys include a number of plains, the Danube series ending in the great Danube plain which extends from the Timok to the Black Sea. Between the Balkans and the Rhodope Mountains there is another large system of somewhat undulating plains, including those round Sofia and Philippopolis, and those along the Maritza and Tundza, famous as the chief centre for "attar of roses." Other smaller but warm and fertile plains lie in the valleys of the Struma and other rivers which flow southwards from the Rhodope Mountains.

The climate of these Balkan-lands is referable to three distinct European types. The West Moesiatic zone, covering most of Servia, is distinguished by northerly and easterly winds, January and February being the coldest months, but frost occurs on more than one hundred days per annum; the spring is cool and moist, the summer is hot with an average of 65 days over 75° F., the autumn is long and warm during the day, but night-frosts occur in September. The East Moesiatic zone coincides with the plain south of the Danube; east winds predominate and bring a climate like Southern Russia; the winter is shorter than in the western zone, but is intensely cold (January +5° F. to -5° F.), and the Danube freezes about once in three years; the summer is dry and hot, temperatures of 104° F. being attained. The South Moesiatic zone with a Mediterranean climate is most typically represented in Eastern Roumelia, but it penetrates into many of the valleys; summer conditions last from May to October, and the lower temperatures rarely

reach freezing-point. The relation of these three types of climate is discussed with reference to tectonic factors on the one hand and to the vegetation on the other. The northern extension of the Mediterranean climate and flora is defined by the high Rhodope range, but "enclaves" of southern plants are met with up the valleys as far north as the slopes of Vitosa, just south of Sofia. This same warm climate extends up the valleys and spreads over the Roumelian plain, which is much warmer than the shores of the Black Sea, because it is protected from the easterly and northerly winds by an undulating country. Turning now to the north, one sees that the tectonic factors favour a southward extension of the climatic conditions of continental Europe. Sofia, for example, has almost the same annual temperature as Vienna which lies 6° north, and it is much colder than places on its own latitude in northern and central Italy and in western Europe. The influence of mountain ranges is very evident on the Danube plain: the plains of Hungary and Roumania are comparatively warm because they lie close under the shelter of the Carpathian system; on the other hand, the plains between the Danube and Balkans are too far south to benefit, but receive the full effect of the north winds from snowy summits. Thus the northern slopes of the Balkans present a distinct contrast to those on the south, where the Mediterranean conditions are evident. The great summer drought of the Danube plain is due to the prevailing east winds from Southern Russia, which exert their influence till stopped westwards by the mountains of Servia, and they penetrate up valleys such as the Isker to the district round Sofia. In Servia, the Save and the Danube flow from west to east, but along the tributaries, the Drina and Morava, north winds penetrate far southwards into the higher valleys amongst the Dinaric Alps. There are, however, sheltered "enclaves" where southern plants assert themselves.

Dr. Adamović is a strong supporter of the influence of tectonic factors on vegetation, and it has just been shown how they affect the climate in Moesia. In discussing the ecological or environmental conditions of the vegetation the same argument is maintained, as may be indicated by a few extracts. "In many ecological publications, the greatest influence is ascribed to climatic conditions." "Others strive to trace everything to the influence of the soil." "Without denying that great influence must be ascribed to these two factors, we must still maintain that neither climate alone, nor soil alone, nor both together, entirely determines the composition and the character of the vegetation." The author is thus of opinion that the influence of tectonic factors is neglected. One might discuss this imputation if any ground existed for it, but no one who has read the ecological writings of Schimper, Warming, Schröter, or Flahault, can lay them down without feeling that oceans, mountains, rivers, and plains all play their part in influencing climate, soil and vegetation. There is, however, enough in Dr. Adamović's treatment of this subject to convey a lesson in considering the vegetation of say the mountainous parts of Britain. The influence of mountains as barriers to climate has its effect on the vegetation,

and, as already pointed out, the winds prevailing in a valley must bring distinct conditions, which ought always to be considered. Mountains and valleys are thus routes of migration for plants, because somewhere, high or low on the slopes, any given species can find those conditions best suited for its full development and reproduction. Thus to many plants the Danube plain would be a complete barrier, but the fact that the Carpathians come down to and cross the Danube opens a way for exchange between north and south. A long simple mountain range without lateral spurs or broad intersecting valleys is well adapted to act as a bridge for migration, but the number of species will probably be small because the slopes are everywhere exposed. The conditions on a mountain "massif" are different, spurs branch off in many directions, thus affording much variety in exposure and shelter, and favouring a greater number of species. The mass is also less liable to extreme climatic conditions, and in Servia the presence of grouped mountains furnishes the lower lands with moisture, an important item in a region with summer drought; a longer winter also results, but this furnishes conditions suitable for the growth of species requiring moisture and a cool climate. The author also confirms an important conclusion in phytogeography, namely that in a great "massif" all the zonal limits of plants are lifted upwards. This means, using local examples, that a tree-limit of 2000 feet may be expected in the heart of the Grampians where altitudes of 3000 feet are common, but on long simple ranges like the Sidlaws and Pentlands where the higher altitudes are about 2000 feet, the possible tree-limit is not more than about 1500 feet. In the same way, the cultivation of crops is actually carried higher in the Perthshire "massif" than it is on the long open ranges. Dr. Adamović attributes this to wind more than to temperature or soil. The higher and more complex the mountain group, then so much higher lies the most destructive sphere of the wind; hence there is for plants a greater area available with a favourable environment, including suitable insolation, soil-warmth, and soil-moisture. The "massif" also tells in another way. On a narrow range with peaked summits, narrow ridges and steep broken slopes, the atmospheric agents which effect weathering and erosion have full play, hence screes of talus and wind-swept rocky slopes occupy a large proportion of the ground and are unsuitable for a large plant population. On the "massif" all this is modified, and a greater part of the area consists of rounded summits with broad intervening cols and gentle slopes completely clad with grassland, moor or forest. Here erosion has less effect, the soil is less disturbed, and the primitive vegetation remains, whereas on recently disturbed soil only a few relict species can retain their place and a number of new-comers find a home.

A considerable part of the memoir deals in detail with the formations constituting the vegetation, but a passing glance at a few of the more noteworthy must suffice. The most important forest of the Mediterranean part of the area is that of the Flowering or Manna Ash (*Fraxinus Ornus*). This tree forms the chief element in a somewhat

mixed forest in which the Silver Lime (*Tilia alba*) is also conspicuous. It is a characteristic forest for the hilly parts of the Balkan Peninsula, and the author claims it as a distinct forest type from the variety and number of species represented. Amongst the woodlands of Britain there is a type distinguished by prevalence of the Ash (*Fraxinus excelsior*) with a characteristic undergrowth, comparable in some ways with the Manna Ash woodlands of the Balkans. In both cases the dominant trees form an open canopy through which much light passes, and this accounts for the rich ground-vegetation; both formations are also partial to calcareous soils though occurring also on others. The Manna Ash formation is regarded by Dr. Adamović as derived from an original Oak forest, which is still found in patches where the Pubescent Oak is dominant with our British Oak as a rarer species. The usual scarcity of Oak is put down to disforestry by man, the valuable Oak being taken and the less valued Manna Ash, Lime, Horse Chestnut, &c., being left. After disforestry, the Oak is slow in natural regeneration, whereas its rivals grow up quickly in great numbers. Erosion, again, during the time after disforestry, wastes the deep soils which the Oaks prefer, but this does not affect its shallow-rooting competitors. In the cooler northern parts of the Balkan-lands, Oak forest is widely distributed about the valleys and lower slopes of the hills, but here the characteristic Mediterranean associates of the ground-vegetation are lacking. In every way it is nearer the familiar British Oak forest, although the dominance of the British Oak is disputed by the Hungarian Oak (*Quercus conferta*). Amongst common trees and shrubs may be noted Aspen, Birch, Ash, Wild Cherry, Apple, and Hazel, all familiar enough in our own woodlands. The forests of the higher mountains include Silver Fir, Scots Pine, and Beech, but especial interest is attached to the Omorica Fir (*Picea Omorica*) discovered last century and now one of the finest of introduced Conifers in Britain; it is indigenous in the valleys of the Dinaric Alps.

Many plant formations of lower stature are also described in detail, but reference must be made to the original. An important type may be mentioned, the "Sibljack," which has a wide distribution through the whole Balkan Peninsula. It is a copse or bush rather suggesting the "Maquis" so familiar to travellers along the Mediterranean coasts, but the author regards it as distinct. The most familiar of the dominant shrubs of the "sibljack" is the Lilac, and one can imagine the beauty of square miles of this in flower. It is also instructive that the vegetation of the Balkan-lands, which begins in a Mediterranean climate, ascends zone after zone till it finishes exactly where our Clova Mountains do, in alpine crags scattered about in a mass of Blaeberry and other species of *Vaccinium* on a peat soil, along with the familiar Scottish associates of this formation.

The agricultural products of the Balkan-lands are very varied, ranging from oats and wheat to maize, tobacco, and other crops of the Mediterranean region. But the British farmer would be aghast at the usual practice of the Balkan peasantry "until thirty years ago under

Turkish government"; this consists in sowing wheat, barley, rye and maize all altogether in one field, and as no trouble is taken to obtain pure seed-grain, the mixed produce is sown year after year, till weeds accumulate to as much as ten per cent. of the whole crop. The most noteworthy cultivated plant in the plain round Adrianopolis is the Rose, grown in fields for the petals which are collected in May and June and distilled to extract the oil "attar of roses." This industry is extensive; in 1907, 5000 lb. of the oil were placed on the market; in 1904 over 8000 lb. Each lb. of "attar" is the product of about 3500 lb. (31 cwt.) of rose petals, and as each grower generally distils his own produce, we are told that at least 13,000 stills are in use.—*W. G. S.*

Vegetation of Woodlands. By *W. G. Smith* (*Trans. Roy. Scott. Arbor. Soc.* xxiv. 1, pp. 6-23; Jan. 1911, and 2, pp. 131-139, July 1911).—A wood consists of trees, shrubs, and ground-vegetation, and according to the age, density and shade-casting powers of the trees, the lower vegetation is developed so that for each type of woodland there is a corresponding type of ground vegetation; this relationship is briefly discussed. While in Britain at the present time there are few primitive woods, still many woods are little altered from the primitive condition and are semi-natural. From recent observations it is known that these woods follow definite tracts of country, their distribution being determined partly by climate, mainly by soil-factors. The larger types of woodlands are: alder-willow on very wet soils; oak and birch on non-calcareous soils; beech and ash on calcareous soils. Each of these types may be subdivided according to wetness and dryness of the soil, and to amount and condition of humus. In recognizing types of woods, the ground-vegetation is a useful guide, and it also indicates characteristics of the soil which may be made use of in forestry; it is also a guide in determining whether a wood is progressive or degenerating. Several types of ground-vegetation are dealt with in this paper and it is pointed out that the condition of the undergrowth is actually observed by the forester in estimating the growth of a wood, although not often referred to in forestry literature.—*W. G. S.*

Veronicas, Herbaceous. By *S. Mottet* (*Le Jard.* xxiv. 565. p. 261; Sept. 5, 1910; with 1 fig.).—In continuation of a previous note on shrubby Veronicas, this article enumerates the herbaceous species and their habitat. They fall into two groups; 1 upright, tufted, 3 ft. or more in height; 2, low, creeping, forming a carpet.

Among the former the best are: *V. spicata* Linn., *V. incisa*, *V. pinnata*, and *V. latifolia*, which are larger and more robust; *V. longifolia* Linn. var. *subsessilis*, from Japan, the most ornamental of this group, but unfortunately not hardy; *V. incana* Linn., with grey-green leaves, and grey-blue flowers; *V. virginica* Linn., very tall with white flowers; *V. gentianoides*, a distinct species, from the Caucasus, with

oval shining leaves, prostrate, and tall spikes of pale blue flowers and small leaves. Some have white flowers and variegated leaves.

Less well-known are the creeping species, which are particularly suited for rockwork. Among these are: *V. prostrata*, *V. saxatilis*, *V. aphylla*, *V. Allionii*, *V. nummularia*, *V. alpina*, *V. repens*, and *V. didyma*.—F. A. W.

Villaresia mucronata (*Bot. Mag.* tab. 8376).—Chile. Family, *Icacinaceae*. Tree, 40 feet high; leaves, alternate elliptic-oblong; 2-3 inches long on old trees, with a spinulose lip only; on younger plants, and on basal suckers, with a spinulose-toothed margin; leathery; flowers, 5-merous; petals, yellowish-white, $\frac{1}{2}$ inch across, in dense clusters.—G. H.

Vine Manuring. By F. de Castella (*Jour. Agr. Vict.* May 1911, pp. 346-353).—Vines have been increasingly manured within the last twenty years. Gypsum is very largely used together with oil cake, superphosphate, sulphate of potash. Basic slag is generally preferred to superphosphate in all except limy soils. Organic matter is of importance added in the form of farm-yard manure, where obtainable in sufficient quantity, also desiccated blood and animal refuse, fish guano, woollen rags, horn turnings, and débris (perfectly roasted), also vegetable substances, as oil cake, sea-weed, pressed wine skins, branches of scrubby plants, such as box and *Cistus*, which are chaffed before ploughing in.—C. H. H.

Violet Disease (*Oester. Gart. Zeit.* vol. vi. pt. 3, p. 112).—To prevent the disease produced by *Urocystis Violae* moisten the seed with a $\frac{1}{2}$ per cent. solution of formalin, and sterilize the ground with an 0.8 solution.—S. E. W.

Watsonia Mariana Ardernei. By S. Mottet (*Rev. Hort.* Nov. 1, 1910; pp. 503-5; two illustrations).—A very handsome bulbous plant of the *Iris* family allied to the *Freesias* and *Gladioli*, and by the illustrations forming fine floriferous clumps 5 feet high, bearing branched panicles of perfectly white flowers, admirably adapted for wedding bouquets and table decoration. Plant out in April like *Gladioli*.—C. T. D.

Weeds, Seeds of Michigan. By W. J. Beal (*U.S.A. Exp. Stn., Michigan, Bull.* 260; March 1910; 214 figs.).—A study of the seeds or seed-like fruits, the illustrations depicting them with great care and minuteness of detail. Years ago there were only 35 kinds of weeds in the State, now there are nearly 250, most of them coming from older countries.—A. P.

White Fly, The Woolly. By E. A. Back, Ph.D. (*U.S.A. Dep. Agr., Bur. Entom., Bull.* 64, pt. viii.; May 7, 1910; 1 plate, 4 figs.).—An account of *Aleyrodes howardi*, Quaintance, a new enemy of the Florida orange hitherto only known to infest orange trees in Cuba and

several other West Indian Islands where it is a serious pest, possibly rivalling the well-known *Aleyrodes citri* Riley and Howard, in Florida.

V. G. J.

Wisteria multijuga (*Gard. Mag.*, No. 2935, Jan. 29, 1910, pp. 85).—The value of *Wisteria chinensis* is well known, but *W. multijuga* is not so often seen. If it is not quite so free flowering it has other charms which more than compensate. A rampant grower, its great distinction lies in the production of racemes which are often three or even four feet in length of an equally beautiful colour as *chinensis*. It is very suitable for a fence, pergola, or arch.—E. B.

Xeronema Moorii (*Bot. Mag.* tab. 8342).—Nat. ord. *Tiliaceae*; tribe *Asphodeleae*. New Caledonia. Herb, leaves $1\frac{1}{2}$ feet long, finely dotted; scape with raceme 6 inches long, abruptly bent; flowers erect, reddish purple, 8 lines long; stamens twice as long as the perianth; anthers dark purple.—G. H.

Yucca filifera. By Charles Cochels (*Rev. Hort.* Sept. 1, 1910, pp. 339-402; one illustration.)—The illustration, a reproduction of a photograph, represents a most extraordinary specimen of this species growing at Saint-Anné's, Hérault, France. It was planted about 1869, and has now a trunk of about 13 feet high and about 10 in. circumference, bearing a number of branches forming a huge arbore-scent head about 40 feet high and 20 in. diameter, the whole clothed in decumbent leafage. The more remarkable feature, however, is the regular annual production of a number of huge pendulous bunches of flowers of a lemon-like odour, about a foot through and 8 or 9 feet long, white with greenish exterior, the whole forming a most handsome plant. It is to be noted that this is not a synonym of *Y. filamentosa*, which is of different habit. Will stand -15° Cent. $=27^{\circ}$ frost Fahr. Should be planted quite in the open, in full sun.
C. T. D.

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PART III.

SOME DIFFICULTIES IN FLOWER-SHOW SCHEDULES.

[Being a Paper read by the Rev. W. Wilks, M.A., Secretary of the R.H.S., at the Affiliated Societies' Annual Conference held on October 11, 1911.]

I VENTURE to think there is no more fertile ground for error and misunderstanding, and consequent friction, than is provided by the wording of many of our Flower-Show Schedules. Speaking with more than a quarter of a century of practical experience in framing and interpreting Schedules, I am profoundly impressed by the subtleties and limitations of language to express clearly and accurately the meaning intended by the Schedule-maker with absolute exactness—and yet of all things a Schedule should be exact. The very nature of the subjects involved—both floral and individual—render the task most difficult. Flowers, fruits, and vegetables, all three, are so full of variations and complexities of nature and definition, that only wide experience, intimate knowledge of garden life, and a thorough understanding of the genius of the English language, can enable anyone to frame a Schedule successfully. As to the individual element in the difficulty, there are some who, on the issue of an Act of Parliament, a County Bye-law, or a Flower-Show Schedule, at once set to work to discover its discrepancies and loopholes, and to manipulate them to their own advantage. Here, therefore, I would give my first advice. When a Schedule-maker has drawn up his Schedule, attack it actively from a quibbler's point of view, and get two or three competent friends to do so also; or if there is a Show Committee, then each of its members should revise it, for when once issued, they are both collectively and individually responsible for its smooth working. By this means many doubtful points, or points capable of diverse interpretation, and inexact definitions are sure to be discovered, and can be rectified, which would otherwise remain undetected, until misunderstanding and heart-burnings arise on the Show day itself.

During the last year or two I have been carefully collecting examples of errors in Schedules which have come under my own supervision, and of the difficulties arising therefrom;—and this paper has been written in order to bring a few of these actual examples to your notice. For just as the interpretation of the common law of our land is based upon the cases tried in the Courts, as explaining and establishing it, so, somewhat similarly, the interpretation of the laws governing a Flower Show will be better understood if examples of defective, inexact, or erroneous wording of Schedules, or the misunderstanding of them by exhibitors, are considered. And as the R.H.S. Code of Rules for Judging, the latest revision of which was published this summer, has become, or is becoming, the generally accepted code throughout this country and the Colonies, I shall, as far as possible, bring these Rules to bear on the points considered.

As I open this Code of Rules, my eyes immediately catch these lines in the Preface: "Too great stress cannot be laid upon the necessity which exists that Schedules should be framed with the utmost care and exactness. Too frequently indefiniteness, or looseness and ambiguity of expression . . . are responsible for much of the dissatisfaction which so often arises."

The following are actual examples of such inexactness of expression:—

1. Class for "THE BEST DISPLAY OF PRESERVED FRUITS."

This immediately suggests the question, "What is meant by the word 'preserved'?" Is it bottled fruit, or is it jams, or is it dried fruit—or is it all or any of them? The Schedule nowhere gives any clue to the interpretation of the word, and an intending exhibitor must decide for himself which he will show, and risk loss of points or even disqualification. The Schedule could so easily have used the word "bottled" instead of "preserved," if bottled fruits only were intended; or if the wider scope of "any preservation" was allowed, it should have run "Display of Preserved Fruits; Bottled, Dried, and Jams all admissible."

Perhaps you will say, "But anyone could have written to the Secretary." Well, now, as it happens, one exhibitor did so write, and the reply was that "Bottled fruit was meant"—and, of course, that exhibitor showed only bottled stuff. And what was the issue? That exhibitor's bottled fruit was superior to anyone else's, but the judges gave the first prize to a collection of bottled fruit and jams, with one or two specimens of dried fruit, holding that the larger and more varied exhibit overpassed the slight superiority of the other's bottled fruit, and that as the variation was distinctly permissible, according to the Schedule, they could not accept the interpretation of the Secretary, especially as it would disqualify all the other exhibitors, who had, one and all, included jam in their display.

2. A Class for "A BASKET OF VEGETABLES."

There were several entries for this; all the competitors but one showed their produce in boxes, and the box-staged vegetables happened to be best, and got all the prizes awarded. Thereupon the one basket exhibitor lodged a protest—and rightly—but was told that "basket" simply meant a "receptacle of any kind"! Now, if that was meant, why did not the Schedule say so? The word "basket" has a definite and specific meaning in horticulture, and in our language, and cannot possibly be interpreted to mean "any" receptacle, which might be a tin-pot or a basin. All the exhibitors showing in boxes ought, in all fairness, to have been disqualified.

3. My next example deals with the difference of "or" from "AND."

These two small words are the innocent cause of repeated difficulty. A class reads, "Six vases of cut flowers—indoor and outdoor." In this class an exhibitor staged outdoor flowers only, and being disqualified, argued that "and" implied a choice of either. He was wrong. The word "or" would, of course, have allowed the alternative, but the use of the word "and" demanded the inclusion of some at least of both in the exhibit. And further, if either one or both were intended, both "and" and "or" should be used with a stroke between them, thus, and/or.

4. MISDIRECTION BY COMMITTEES.

Letters of complaint frequently reach me under some such circumstance as this: A is not an amateur according to the rules of a certain local society. But he makes representations to the Secretary or to the Committee, which lead them to sanction his showing as an amateur. This is, of course, all unknown beforehand to the other exhibitors. He wins the first prize, and B—my correspondent—and C and D, who are all three undoubtedly amateurs under the rules of the society concerned, do not. Can you wonder they protest?

What reasons the Committee had for deciding as they did, and permitting A to show as an amateur, they themselves know; but it illustrates the folly and injustice of making rules and not abiding by them rigidly. A may be said, not unnaturally, to want to get some advantage from which the wording of the Schedule, strictly interpreted, excludes him, possibly somewhat unfairly. The Committee recognize this, and instead of altering the rule which bears unfairly on him, make an exception in his favour and allow him to enter the desired class. B, C, and D lose, and feel that a great injustice has been done them, and jealousies and heart-burnings are aroused which it may take years to allay. And so, because the Committee has not rigidly held to its Schedule, it finds itself in this unfortunate dilemma. It has violated its own Schedule, has set up what appears to the others to be an unfair competition, and has caused a miscarriage of justice for which there is no remedy. The Committee of a Show is all-powerful,

and if it told A he might show as an amateur, A is in no way to blame for doing so, and all protests by B are useless. But it can never be either politic or right for a committee to depart from its own rules. They must always be literally and strictly interpreted according to the genius of the English language. If the rule is wrong, revise it by all means on the first possible occasion; call a special meeting of the Society, if needs be; but a rule, so long as it exists, should be adhered to. The R.H.S. Code of Rules for Judging says, "The Rules and Regulations under which the Show is held cannot too clearly be stated" (Sec. 25). Even "Alterations in the arrangements should be avoided, except in cases of actual necessity, and then every possible means of publicity should be resorted to for making them generally known" (Sec. 26).

Whilst considering disputes between committees and exhibitors, I feel bound to notice another most unfortunate and frequent source of trouble. An exhibitor has worked with diligence and care to produce prize stuff, and has attained a leading position, say, as a grower of vegetables, in the district. Year after year he carries off all the first prizes in the vegetable classes. Perhaps jealousy, and certainly disappointment, takes hold of his fellow-competitors, and they leave off, or threaten to leave off, showing against him. Fear, for the future success of the Show and the Society, at once springs up in the minds of the committee. They find—or if they cannot find, possibly they manufacture—a reason for disqualifying or excluding the too successful exhibitor; and they think to have saved the Show, but by a somewhat unjust, or at least a questionable act. Rather should they have sought, by a remodelling of the Schedule, to have overcome the difficulty of the position. So many ways offer themselves. For example, exhibitors can be restricted to a stated number of classes (say eight or ten, or any other number), leaving an ample number for less successful growers to compete in; or they may be restricted to certain classes thus: "Exhibitors in classes 1, 4, 7, and 10 cannot enter in 2, 3, 5, 6, 8, and 9," and so on. A better way possibly than either of these is to put a maximum limit on the amount of money value which any one exhibitor may take—allowing him to show in any number of classes in which he is qualified to show, but making a clearly worded rule that as soon as his prizes mount up to the maximum value allowed to any one exhibitor to take, he drops, *ipso facto*, out of all further competition, being credited with the honour of having been adjudged first or second or third in other classes, but being debarred from taking the money attached to such classes, beyond the maximum amount fixed.

5. The words "KINDS AND VARIETIES."

The confusion of these two terms, or their careless substitution one for the other, often land Schedule-makers in far-reaching difficulties. Here is an example which occurred only a few days ago. The Schedule reads thus: "Fruit—Collection of Six Varieties; White and

Black Grapes allowed." The first prize was won by a collection containing (1) Black Grapes; (2) White Grapes; (3) Figs; (4) Peaches; (5) Nectarine 'Pineapple'; (6) Nectarine 'Humboldt'—and, very naturally, the two dishes of Nectarines raised vigorous protests from other exhibitors. And yet the protests will not stand for a moment, as all the Schedule asks for is "six *varieties* of fruit," and 'Pineapple' and 'Humboldt' are distinct and undoubted "*varieties*" of Nectarines: no one could possibly call them the same. At the same time, from the words "White and Black Grapes allowed," it is evident that what the writer of the Schedule meant was "six kinds"; otherwise, why say that a white *variety* and a black variety of Grapes are *allowed* if only varieties were meant? But it is no use meaning one thing if you say or write another. And in the case of a Schedule the judges are bound to adhere to the printed words. And if the words "six varieties" are printed, any exhibitor may show six dishes of varieties of any one fruit—say, six varieties of Peaches or of Pears or of Grapes, always provided they are all distinct—or he might show four varieties of Peaches, or any other conceivable combination of six distinct varieties. Whereas, if the word "kind" had been printed, this exhibitor would have been rightly disqualified for including two dishes of varieties of Nectarines in his collection. 'Pineapple' and 'Humboldt' are not different *kinds* of fruit, but different *varieties* of the same kind—namely, Nectarine. The R.H.S. Code of Rules for Judging, Sections 1 and 2, defines very clearly what, for Show purposes, are to be considered kinds and varieties.

Many difficulties arise over the words "HARDY" flowers, and "ANNUALS." For example, Section 195A of the Rules reads thus: "In the case of annuals (unless specially forbidden) colour variation is always allowed in the bunches." And here is a case in point. A Schedule asked for "A COLLECTION OF ANNUALS—SIX DISTINCT VARIETIES." A competitor staged Shirley Poppies as one variety—of course, with mixed colours. A protest was lodged on account of the colour variation, but the Committee rightly disallowed it. Shirley Poppies, being an annual, the mixture of colour was therefore permissible.

Here is another instance. I am asked, In a class for "CACTUS DAHLIAS—NOT LESS THAN SIX VARIETIES," would not the words "six colours" be more accurate, *as the variety is one*? Here there can be no confusion by the use of the word variety, because the colour variations in Dahlias sufficiently indicate the "*varieties*" of that plant.

Again, in a class for "SIX VARIETIES OF HARDY SPRING FLOWERS," two varieties of 'St. Brigid Anemone' were put up. To do so was perfectly admissible. Had the wording been "six kinds," the exhibit of course would have been disqualified.

The use of the word "DISTINCT" also brings its difficulties. There was a class for "EIGHT STOVE OR GREENHOUSE PLANTS DISTINCT." One exhibitor has two *Caladiums* amongst his eight, and another two

Coleus; in each case the plants showed a distinct difference of colour. The word "distinct" may in some quarters have gained the specialized meaning of "distinct kinds," but the wording of such a class is, to say the least, ambiguous. It is obviously open to question whether "distinct kinds" or "distinct varieties" is meant. The addition of either of the two words would have avoided all doubt and made the competition fair.

Before leaving the words "KIND" and "VARIETY," may I point out that the rule allowing a mixture of colour for annuals no longer applies to Sweet Peas. This flower having been so highly specialized of recent years the Sweet Pea Society has decided to require only one variety in a bunch, unless it be stated in the Schedule that the colours may be mixed.

6. The following three cases refer to FOLIAGE:

(1) "OWN FOLIAGE." A class required flowers to be shown "WITH OWN FOLIAGE." This means foliage cut from the same plant or same variety of plant as that which bore the bloom, the object being to show the characteristics of the foliage of the particular variety shown. For example, if 'Gloire de Dijon' Rose with own foliage was asked for, all the foliage must have been cut either from actually the same plant or plants as the blooms have come from, or from other 'Gloire de Dijon' Roses. If foliage of 'La France' or of 'Marie van Houtte' or of any other variety save 'Gloire de Dijon' were used, the exhibit would of course be disqualified. Or if a particular Carnation or a particular Sweet Pea "with own foliage" were asked for, the only foliage used must have come from plants of the particular variety of Carnation or Sweet Pea named; but it need not have come from the identical plants from which the blossoms shown were gathered—all that is required being that the blossoms and the foliage shall both be of the variety asked for and of none other. (2) "ANY FOLIAGE" or "ADDED FOLIAGE" means that foliage of plants other than that of the flowers may be mixed with them. An exhibitor in an "added foliage" class staged Sweet Peas, and for foliage used that of Everlasting Peas. He was fully justified in doing so, for the Schedule allowed any foliage and excluded none; but he had the misfortune to be unfairly disqualified. (3) *Gypsophila*. *Gypsophila* is not foliage, but is a flower; and therefore a class requiring or permitting any or added foliage is not satisfied by using *Gypsophila*. A class permitting it should say distinctly, "*Gypsophila* allowed with, or instead of, other foliage."

7. "HERBACEOUS."

Schedule-makers cannot too closely adhere to Rules 180 and 197 concerning herbaceous exhibits, and judges cannot know them too accurately. For example, I was once asked to say whether Montbretia and Seedling Pinks are allowable in the following class: "THE BEST NINE BUNCHES OF HERBACEOUS CUT FLOWERS—NOT LESS THAN SIX SPECIMENS. NO BULBOUS ALLOWED."

First as to the Montbretia. Rule 184 describes herbaceous as "Plants with flower-stems which die down to the ground yearly, but having rootstocks remaining alive through several winters. For garden purposes 'rootstock' includes all bulbs, corms, and tubers."

Now, the rootstock of Montbretia is a corm, and therefore is clearly eligible for the class, the only specially excluded plants being "bulbous."

Seedling Pinks were, on the other hand, irregular. Rule 185 includes Pinks among suffruticose plants, and they certainly do not agree with the habit of growth required by the word "herbaceous." Rule 186 says: "Such plants as Carnations and Pinks are open to disqualification under 'herbaceous.'" They certainly do not die down in winter, but are evergreen—and are, in fact, dwarf, hard-wooded, shrubby plants.

8. SALADINGS. The following is a very badly-worded class: "COLLECTION OF SALADS—SIX DISTINCT KINDS."

This is what was meant: "A Collection of Vegetables used for Salads." As the class stood it might have been interpreted to require an exhibition of a cook's art—six prepared salads—though even then the words "distinct kinds" are not clear, unless Lettuce salad, Potato salad, Onion salad, Cucumber salad, Fruit salad, Asparagus salad, and suchlike kinds are meant.

Note also in passing that unless the Schedule distinctly allows them to be exhibited as fruit, Tomatos, though fruit, are accounted as vegetables, being used nine hundred and ninety-nine times as such to once as fruit. Vegetable Marrows, Pumpkins, Cucumbers are the same. If it is desired to account any of them as fruit, the Schedule must distinctly say so.

Broadly considered, any vegetable produce may be used as salading, according to the skill of the cook in preparing it and the taste of the consumer. Potato salad, for example, is a great favourite with many; so too are Asparagus salads with all who have tasted them, and fruit salads are commoner than either. But it is more than doubtful whether any judges would allow Potatos and Asparagus, and certainly not Raspberries, Peaches, Pineapples, and Plums, to be shown as "salad plants." It might possibly be wise in future for Schedules, instead of asking for salad plants or saladings, to be worded, "vegetables ordinarily used uncooked as salads"; this would exclude Potatos, Asparagus, and Fruit, though it would leave a difficulty with regard to Beet, which is ordinarily cooked before being put on salads. In Show-salads, however, the Beet *need* not be cooked.

9. SIMILAR AND DISSIMILAR.

Some Schedule-makers love to use words that are indefinite. What, for instance, does the word "dissimilar," so beloved of many, mean? I take the following at random: "TWELVE HERBACEOUS PLANTS DISSIMILAR," and "NINE ASTERS DISSIMILAR."

Now, it is evident that if, as I fancy, China Asters are intended, then dissimilar can only mean "different colours"; and, if so, does it only mean "different colours" when applied to twelve herbaceous plants? If, on the contrary, it means something much more stringent as applied to herbaceous plants, why does it not mean the same with China Asters?—and yet, how could it? Would it not have been just as easy to write "distinct colours," if that is what is meant, or "distinct varieties," if that is meant, or "distinct kinds," if that is intended? As for "similar" and "dissimilar," an exhibitor may well wonder what the words mean. Are three men differently dressed similar or dissimilar men? Are three children—one with a black, one with a white, and one with a blue frock—similar or dissimilar children? They are certainly similar *men* and similar *children*, but they are *dissimilarly* dressed. And it is exactly the same way with nine China Asters: they are similar flowers of dissimilar colour. Will you, then, disqualify them because they are from one point of view "similar," or accept them because they are from another point of view "dissimilar"? Either action would be equally defensible, I think.

Much more could be said, but this is enough to indicate some of the commonest difficulties in Schedules; and, taken with the Rules for Judging, it may be helpful. If anyone should recognize difficulties which they have personally referred to me, I hope they will not think this Paper a violation of confidence, as no one knows whence the examples cited come, or how often others have fallen into precisely the same difficulties as themselves. The making of a really exact Schedule is, indeed, a matter of no little difficulty.

May I point out, in concluding, that the R.H.S. Code of Rules, which have been revised this year, may be obtained in the Office?

ON THE EFFECTS OF EXCESSIVE DROUGHT UPON PLANTS; OR THE ORIGIN OF XEROPHYTES.

By the REV. PROFESSOR G. HENSLOW, M.A., V.M.H.

[Read October 24, 1911; Dr. A. B. RENDLE, F.R.S., in the Chair.]

IN my first lecture this year I illustrated the effects of an excess of water upon plants. In the second it was shown that the Monocotyledons were descended from aquatic Dicotyledons. In the present lecture I propose considering how plants adapt themselves to excessive drought.

Roots.—If sufficient water be present in the soil or sand, as in deserts, but at a considerable depth, the root-tip is stimulated by the slight dampness arising from below and continues to grow till it reaches it. Hence small annuals in the desert near Cairo often have roots a foot or more long, while those of some old specimens of *Colocynthis* have been traced to very many feet in length.* In allusion to this power of growth in "search of water," Dr. LINDLEY observes:—"Plants, although not locomotive like animals, do perpetually shift their mouths in search of fresh pasturage, although their bodies remain stationary. As an example, in a garden at Turnham Green a *Populus monilifera* (Canadian Poplar) was found to have sent a root thirty feet horizontally, including its dip, beneath the foundations of a wall, and then to have passed into an old well to the depth of eighteen feet, having then broken up into a mass of fibres so finely divided as to resemble yarn."† Similarly, a turnip root penetrated a field drain and grew to upwards of six feet in length.

Water-storage Tissues.—These occur in all parts of plants in deserts, and even the roots are not exempt. Thus three species of *Erodium* bear tuber-like swellings on their roots for this purpose.

As root-hairs are generally absent on roots living in water, so, on the other hand, are they abundant when moisture is scarce. The late Dr. M. T. MASTERS found that when mustard was sown in rammed clay, "the radicles penetrated it to reach the side of the pot. Having done so, the roots produced an abundance of root-hairs." This he attributed to the presence of a thin film of moisture.

Stems.—A hard wood is characteristic of dry regions. Thus all the trees of Cape Colony are remarkable for their solidity. Experiments by P. EBERHARDT showed that the same species of woody plants grown in very dry air, under normal conditions, and in very moist air developed different amounts of woody tissue; much wood being developed under the dry conditions and very little under the moist.

* For other illustrations see my *Origin of Plant Structures*, p. 52.† *Theory and Practice of Horticulture*, p. 19.

Hence we recognize the difference between the timber of oaks and pines (xerophytes), of elm (a mesophyte), and of willows and poplars (hydrophytes).

Stems in dry countries are often used as means of storage of water, as in the Baobabs and "bottle-trees," &c. The pseudo-bulbs of epiphytal orchids growing on lofty trees are means of storing water, while the fleshy-stemmed Cactaceae of Mexico resemble the Euphorbias and Stapelias, &c., of Africa in having the same function. The swollen internodes of *Poa bulbosa* are formed only in dry places.

The wood, as stated, increases in hardness so that what would be a soft biennial herb in England becomes a stunted, gnarled stem of a perennial, as in non-climbing species of *Convolvulus*, *Heliotrope*, &c.

Leaves.—The most characteristic xerophytic features are to be seen in leaves. The parts of plants can only grow to a full size when well supplied with water, as might be expected, and the leaves are relatively reduced in size or may be arrested altogether, as in Broom. A complete series can be found between the large-leaved shrubby Veronicas of New Zealand and the Box-leaf-like form of *Veronica buxifolia* to others resembling the Cypress, *V. cupressifolia*, and the fleshy *V. salicornioides* just like our Marsh Samphire.

The general characters of many xerophytes are mimetic. Some are called "ericoid" when heath-like, as in members of the Daphne family, like *Pimelia*. A leathery or coriaceous type is very common, and as the shoots are equally starved with the leaves, they often terminate in a hard and sharp point, as in our rest-harrow and furze. To prove that it is nothing but drought which is the cause of these peculiar habits of growth, if these and other spiny plants are grown with plenty of water, both leaves and spines grow normally as in ordinary mesophytes.

Fleshiness is another common character. The object is to store water, and it is seen in both stems and leaves. The Crassulaceae are characterized by this type of leaf, as in Sedums.

Very hairy and woolly leaves are common, as the edelweiss of Switzerland, woolly species of plantains and *Convolvulus*, and occur in the desert near Cairo. The hairs on many leaves act as absorbents of dew in the hot, rainless season, and though, like the epidermis, they are often coated with wax, they have "gashes" at the base so that superficial water can pass through below. In some cases the hairs swell into globular bladders filled with water, as in the ice-plant; but the water-storage cells are generally in the interior, as in *Reaumuria*, allied to *Tamarix*. Both of these secrete salts, which imbibe much dew, which is absorbed and stored up within. There is a grove of tall tamarisks near the barracks at Cairo, which flourish well, though they are not artificially watered as the Læbeks (Acacias) are in the streets.

In compensation for the reduction in size of the leaves the "palisade" cells below the epidermis are increased in number from one layer or two to four and even five.

The heredity of xerophytic characters, like those of hydrophytes, may be partial or complete. Thus the fleshy character of Cactaceous plants is permanent and is seen in seedlings raised in England, as are also their spines; but many spinescent plants, if raised in wet conditions, may reproduce them for a season or two, but the spines subsequently revert to branches, as in furze, rest-harrow, sloe, pear, &c. In a wet spring, the spines of barberry are represented by true leaves.

Xerophytic Associations.—These are of various kinds, but all are characterized by a small annual rainfall. The thorn-forests and savannahs of tropical regions are succeeded by deserts and veldts. Maritime regions, and mountains, when approaching the zone of conifers, and high alpine regions, as well as arctic and antarctic zones, are all xerophytic.

What is noticeable is that similar features are found in the plants of all of them—some of one kind, some of another—such as a great decrease in size when one, a xerophytic species, is compared with another of the same genus growing in a more favourable place. Besides a dwarfing, the arrest of the stem is common, giving a tufted habit. In extreme conditions, as those of arctic regions, what are annuals in lower latitudes become perennials in higher zones. Just as hydrophytes are all characterized by similar structures of various kinds, so are xerophytes, proving that the visible, as well as the microscopic structures, in all plants are the result, with heredity, of the responsive power of protoplasm to the external conditions of life. This is the only true and universal explanation of evolution.*

* Those who wish to pursue this subject of ecology should study especially Dr. Schimper's *Plant Geography* and Warming's *Ecology*. My *Origin of Plant Structures* and an *Introduction to Plant Ecology* are smaller.

THE CULTIVATION OF THE FIG IN POTS.

By J. HUDSON, V.M.H.

[Read November 7, 1911; Sir ALBERT ROLLIT, LL.D., in the Chair.]

It is now about thirty-five years since I first successfully cultivated Figs in pots. At that time the system was but little known, but it has since grown considerably, and there is now a good demand for young Fig-trees in pots every autumn. It is to try to encourage this method of cultivation and to induce amateur gardeners to give more attention to what is, even now, a somewhat neglected source of supply of the choicest of dessert fruits, that I have undertaken to read this paper. It may be said that such large fruits cannot be secured under pot cultivation as can be grown upon planted-out trees. I readily admit this; but in point of flavour, I claim that under pot cultivation much more luscious fruits can be grown, for the fruits have their saccharine juices much better developed.

A well-ripened Fig from a pot tree, secured at the right time, is very difficult to beat. A good indication of its perfect ripeness is in the skin beginning to crack slightly, and when it is so thin as to be almost merged into the fruit itself. Another sign is that the fruit has a "tear in its eye." I have yet to learn that mere size, as it pertains to high-class dessert fruit, has any substantial claim whatever. As instances of this one may mention the 'Gros Colmar' Grape when contrasted with the 'Frontignans,' the 'Cayenne' Pine Apple when compared with the 'Queen,' or, to come closer home, there is no comparison between a large fruit of the 'Brunswick' Fig and a smaller example of 'Negro Largo' or 'Bourjassotte Grise.' Since we have developed great size in melons, nothing has been added to the flavour. For this essential, growers cannot now surpass the fine flavour of the old 'Beechwood,' the 'Egyptian Green Flesh,' or 'Turner's Scarlet Gem'; and it is doubtful whether the flavour of these old varieties can now be equalled.

The fine collection of Pot Figs formed at Chiswick under the late Mr. A. F. BARRON, and now transferred to Wisley, has been the means of fostering cultivation in pots. The varieties he got together have formed the nucleus of a very fine collection, and it has been possible to select the best for any special purpose. When Mr. BARRON had these under his charge at Chiswick, I asked him on one occasion if it was really essential to grow them in such large pots. His opinion was in favour of that practice. I thought otherwise, and have retained our collection in comparatively small ones, and to my entire satisfaction. By using small pots, the amount of labour consequent on removal from house to house is considerably reduced. When our late stock has cast its leaves the pots stand pot to pot, thus the room taken up is small. The temperature then for the general stock

is that of an ordinary greenhouse, or no lower than freezing-point, for most of our Figs are arranged for late forcing, and it is, therefore, not advisable to let the temperature fall any lower. When an early batch of Figs is forced in pots, it is always possible to refill the house with a later lot—thus the whole season is worked round on the double-cropping system. This cannot be done with planted-out trees, whilst at the same time the shade imparted is so dense as to render the house of but little use for six months in the year.

It cannot be said that the Fig is difficult of cultivation if given good soil and rational treatment. When in growth it needs attention, and thrives well under the same treatment as that accorded to vines. It luxuriates in a warm, moist atmosphere, and will, in spite of its rapid leaf-development, succeed best without shading. Throughout the East it thrives best in the hottest positions, and in places where scarcely anything else would thrive at all. For soil it seems to favour the alluvial detritus that has worked downwards in the course of time from higher ground, and which contains a high percentage of lime. This fact affords a clue of its liking as regards soil. The Fig will, as a matter of course, grow in soil where the percentage of nitrogenous matter is high, but with disastrous results as to fruiting—it then produces gross shoots and large leaves. This all, to my mind, points to the utility of pot cultivation. Those growers who still practise the planting-out system have come to recognize this in the formation of restricted borders. Even when these are made, it is not possible to produce the same amount of variety as when grown in pots. The prolific character of some varieties is only brought about by restricted root action. Again, gross growth favours disease against which one has to be on guard. Even when grown in pots the vigour of some varieties, such as 'St. John' and 'Pingo de Mel,' is manifest. Both of these, if planted out, may be expected to be comparative failures.

Our method of cultivation is very similar to that adopted with the general run of fruit trees in pots, but we do not repot the Figs every year as we do most other pot trees. On the other hand, we treat the trees according to their individual needs; sometimes all of the soil is shaken off the roots, so much so as to create a wonder if they would overcome this treatment. When this is done, some of the old and inert roots are pruned away entirely. At other times a top-dressing only is given, first clearing out the surface soil to a depth of three or four inches. In doing this care is taken of the roots. These are fairly abundant, having made good use of the top-dressing given during the growing season. They are carefully laid down in the fresh soil, which is made quite firm. I thoroughly believe in firm potting: it is the essential of success in the cultivation of all pot fruits. Our choice of soil for the Fig is a good turfy calcareous loam, rather inclined to be heavy as contrasted with what is termed a sandy loam. To this we add a good proportion of old mortar rubble, pounded down so that the largest pieces are no bigger than a nut. When a handful of this

mixture is taken up the mortar rubble should be clearly discernible. We do the potting at two seasons: those to be forced early are potted in September, and those intended for late forcing in January. The former are afterwards stood out of doors until forcing commences, or until frost is threatening. The latter are all placed pot to pot in a cool house where the frost is just excluded. Here they remain until room can be found for them, as the pot Strawberries cease to occupy so much room. Then a gradual thinning out takes place; this still continues as the early forced fruit trees in pots are hardened off and stood outside.

It is somewhat surprising to note how quickly the Figs respond to generous treatment during the early summer. The houses are closed early, and syringing, with damping down, is carefully attended to.

Insects scarcely trouble us at all; the worst being a scale insect, for which vaporizing with Nicotine and sponging with an insecticide of moderate strength are the remedies. Red spider gives no trouble whatever, and fortunately we have no mealy bug. The mealy bug, where present on Figs, is perhaps the worst of all insect pests. It seems simply to luxuriate upon the foliage and in the warmth and moisture of the house.

As growth progresses and the young rootlets appear upon the surface of the soil we top-dress. In doing this we build up a ring of soil next to the pot, but do not add to that in the centre—some will be sure to find its way there. The soil used for this purpose is rather moist, and it holds well together until the roots have taken full possession of it, then it cannot be very well moved. In less than three weeks this added soil will be full of roots, and no one needs to be told how beneficial this is to the plants. I place a deal of importance upon the work of top-dressing; it is most essential, and in no way impedes the process of watering. We never allow the Figs to suffer from want of water; in hot weather watering has to be attended to closely, otherwise burning would ensue, and the way would be made clear for an attack of the red spider.

RAPID PROPAGATION.

In view of this lecture, I decided early in 1911 to test the capacity of the Fig for rapid growth and early fruitfulness.

In order to gain as much time as possible, we started propagating the first week in January last. The notes made during the season are as follows: Eyes were inserted, some in soil, others in coconut fibre, on January 2, the pots being plunged in a bottom heat of 100°; about 80 per cent. rooted in the fibre and 60 per cent. in the soil. Some were left with one eye, others with two, the results being about the same. The tips of the shoots, where the terminals were well developed, were also inserted. They all grew away well. In the second week of February they were taken out of the propagating frame, but remained in the same house, which was kept at 60° by night and 65° by day, being of course gradually hardened off. These

young plants were potted into five-inch pots on February 21, bottom heat of about 80° being still afforded. The soil used was composed of two parts of good turfy loam and one part of old mushroom bed manure, a good sprinkling of sand being added thereto. Cuttings of the young wood taken from a house that had been started the first week in November were also inserted on February 13. These struck well; the varieties so treated were 'St. John' and 'Negro Largo.' They were potted into five-inch pots on March 4. All were potted into nine-inch pots on May 1. In doing this a space of about two inches was left for top-dressing afterwards. The soil used this time was three parts of loam to one of mushroom manure, and one part of lime rubble with a sprinkling of bone meal.

The first top-dressing was given on June 30, being composed of two parts of loam to one of hop manure, with a sprinkling of lime rubble and bone meal (I should add here that the roots were quite active upon the surface before this or any after surface-dressing was given). The final top-dressing was on August 4, using the same ingredients as before. The first fruits were picked on August 27, less than eight months from the time of striking the cuttings. Since then the plants have been fed twice a week with manure water, and with an occasional sprinkling of blood manure when the pots were full of roots. An indication of the state of the roots may be gained from the fact that the most vigorous plants frequently require water three times a day. The plants struck from cuttings of 'Negro Largo' were quite as good as those from eyes, both in size and in fruit. The cuttings of 'St. John' have also made fine plants, but have as yet yielded only an occasional fruit. They will, however, give a good crop next May if introduced into heat during January. They are now being ripened off with that object in view. We shall not, I think, repot any of this variety before starting afresh, for it is a notoriously strong grower, but shall rather depend upon plunging material and feeding. 'Pingo de Mel,' which is almost identical with the last, requires the same treatment. The best of these young plants now fruiting are 'Negro Largo,' 'White Ischia,' 'Violette de Bordeaux,' 'Col di Signora Bianca,' 'Bourjassotte Grise,' and an occasional plant of 'Brown Turkey.'

Given an average condition of the weather, we hope still to pick Figs from these young plants up to the end of November. [Ripe fruits were picked up to December 28, 1911.—J.H.] The temperature now maintained is about 65° at night with a fall to 60° at daybreak, and as good a rise during the day as we can secure with a moderate amount of ventilation. Now we have to guard against any superfluous amount of moisture, which would tend to damping, causing spots upon the fruit. Later on, as the plants cease to fruit, they will be gradually ripened off, and will cast all their foliage. The temperatures will gradually fall until a minimum of 40° is reached. Lower than that it is not expedient to go with young plants for the first season. About three months' rest will be given them before they are again started into

growth. Next season they will, if placed in warmth during April, yield a good crop during the early autumn, when we find a great demand for Figs.

The 'St. John' and 'Pingo de Mel' will be started during January with the view of having ripe fruit towards the end of May. They will continue bearing for about six weeks, and after that an occasional fruit will be given. The following autumn, however, we shall start them again, early in November, expecting to pick ripe fruit in March. These varieties will, as I have already stated, remain in the same pots until next September, when they will be given a good shift forward. It is somewhat surprising what can be done with the Fig under these conditions. It is amenable both to early and to late forcing when well cared for.

Varieties for Pot Cultivation.—We grow fifteen varieties of the Fig in pots. Of these I consider the following to be the best and most suitable for the purpose:—

For forcing purposes, either 'Pingo de Mel' or 'St. John'; these two are very similar, possessing the same luxuriant growth. Both bear freely in pots when forced early, and both require thinning freely. When ripe the fruits of both are of a pale yellowish-green. The fruits are very sweet and good, but somewhat softer than many Figs. Neither 'St. John' nor 'Pingo de Mel' is recommended for planting out, for both are far too vigorous in growth. 'Brown Turkey' in most British gardens will follow the preceding easily. It is better in my opinion for early than for late forcing. It crops freely with fruits of medium size, somewhat paler than from trained trees. Under pot cultivation it is quite moderate in growth.

For mid-season use 'Violette Sepor' is an excellent Fig, and an abundant cropper. The fruits are of medium size, but somewhat disposed to crack. In flavour it is very rich and syrupy, and its constitution is good.

'Negro Largo' is a well-known and in all respects an excellent Fig, not adapted, it is true, for early forcing, but for mid-season or late crops it is one of the very best we have. It is a most prolific cropper, and this extends over a very long period. From point of flavour it can scarcely be equalled and rarely excelled. It has a disposition to shrivel upon the tree: then it is, in my opinion, at its very best. For packing purposes it is excellent, the flesh being firm and not liable to bruise.

'Bourjassotte Grise,' from the point of flavour and appearance, must be classed as one of the very best we grow. It is very syrupy and rich. When fully ripe its skin is extremely thin. As a prolific Fig under pot cultivation it is excellent. If I were confined to three varieties this would be one of them.

'White Ischia' is a little Fig, the smallest with which I am acquainted. It is most prolific in bearing, and very juicy and sweet when fully ripened. The colour is a pale yellowish-green, and the skin extremely thin. It makes a most distinct dish.

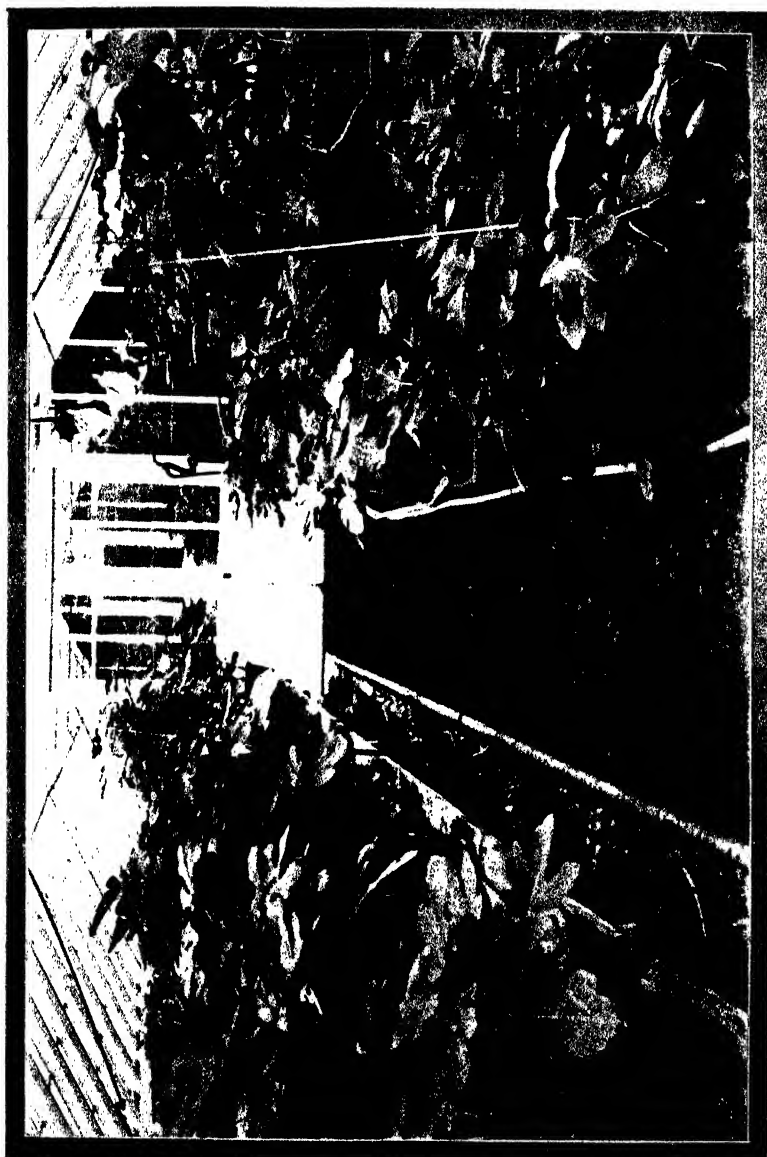


FIG. 137.—FIG HOUSE AT GUNNERSBURY. (*Gardeners' Magazine*.)

(To face p. 512)



FIG. 138.—FIG 'ISCHIA.' (*Gardeners' Magazine.*)

'Violette de Bordeaux' is of all the very dark or nearly black Figs, I think, the best. It is better than 'Nagronne.' The flesh is firm and not so juicy as some, but the flavour is good. It is in addition a reliable cropper, and of somewhat hardy constitution. It also hangs well on the tree.

'Agen,' or 'd'Agen' of some growers, is quite the latest Fig to ripen with us, and it was recommended to me by the late Mr. BARRON for that special purpose. It possesses plenty of vigour, and forms a shapely bush. Its latest fruits will ripen after the leaves have fallen. With us, this year, it bids fair to carry the season of picking well into the end of December. From point of flavour, it must be classed with the very best; in fact, if I had my choice of all the kinds I have named, I should select 'Agen.' Its name is no doubt derived from Agen, a city in the south of France, from which district comes the finest of French Prunes, known as 'Prune d'Agen.'

'Nebian' is a fine Fig also, but it is much disposed to split, so I do not recommend it, even for pots. 'Col de Signora Bianca' is a good, in fact an excellent, Fig, but I prefer 'Violette Sepor,' which crops better. 'Bourjassotte Noir,' though somewhat disposed to split, is a first-rate variety, and a free bearer. Its appearance is very distinct, in colour a deep blue-black, with a dense bloom. It is, I think, the Fig so much imported late in the season into this country, and often in excellent condition, carefully packed in small boxes. It crops freely in pots, but in flavour it does not equal 'Bourjassotte Grise.' 'Figue d'Or' is so very distinct that I feel I must include it, though as the last. It is nearest the 'Brunswick' possibly. Its colour is a golden brown.

Figs as Dessert Fruits.—All Figs should be left upon the trees as long as they can be to secure the fullest possible development of flavour. This cannot, I know, be done so easily when the fruits have to be packed for transit; then they should be fairly firm when picked. We find it a good plan to pick them direct into small fancy baskets, and thus send them in to the table. In doing this some variety can be arranged for—sometimes a dish of dark Figs, sometimes a dish of pale yellow Figs, sometimes a dish of small Figs, and so on.

In packing Figs to send away by rail it is well first to wrap them carefully in soft tissue paper, then to fold each one in a leaf—the small leaves of the vine are very good for the purpose. Then all of them want packing together in a shallow box, one layer only, and as firmly as it is possible to pack such soft fruits. I have already said that one Fig—'Bourjassotte Noir'—may be seen packed in shallow boxes in the fruiterers' shops, but this Fig, like all market produce, is packed when quite firm. For packing purposes it is better to pick the fruits early in the day to secure them as firm as possible. The fruits should, of course, be quite dry when packed. Shallow boxes with square punnets to fit them are the best to use. These will prevent the fruits from shifting if the box be turned upon its end.

I have alluded both to early and late forcing to prolong the season

of the Fig, but it is also possible to grow it for a shorter season in pots. For this purpose I should select 'St. John,' 'Brown Turkey,' and 'Bourjassotte Grise.' These varieties, if given gentle heat to start them into growth in the spring, will yield a good supply without an undue amount of forcing. If placed in a cool house in the summer they will do well. It will be safer, however, to close the house towards the evening until the fruit begins to ripen. Under this system I would encourage the trees to grow into fairly large specimens. During the winter they could be kept in a shed, so long as the roots were well protected against frost. Mice, however, must be guarded against, for they have a liking for the bark of Figs, and will soon do irretrievable harm.

On one occasion when in Rome, I went, as all tourists do, along the Appian Way. Seeing a Fig-tree overhanging the road I secured a few cuttings, thinking I might obtain something different, and so I did, but it was not worth growing. We are now discarding it from amongst our pot Figs. On another occasion I found in our own locality a very strong-growing Fig-tree, which showed plenty of embryo fruit. Of this I procured some cuttings and grew them on to the fruiting stage, when the variety proved to be 'St. John,' of which I had quite enough already. Next season I hope to receive a few of the best kinds grown in the South-West of France from a friend resident in that district, and to see if anything is at all worth adding to those already grown in this country. There are, no doubt, many varieties still not catalogued in our trade lists.

[*Note, December 29, 1911.*—We have just commenced re-potting the main stock of Figs, and find that each plant has a mass of fine fibrous roots.]

THE ROYAL INTERNATIONAL HORTICULTURAL EXHIBITION, 1912.

By MR. EDWARD WHITE, Hon. Managing Director.

[Read November 21, 1911; Mr. R. C. NOTCUTT in the Chair.]

THE Council of this Society has courteously placed the lecture hall this afternoon at the disposal of the Directors of the Royal International Horticultural Exhibition and so enabled them to call attention to the great event of next year. Perhaps one may go so far as to call it the great horticultural event of this generation.

No preliminary flourish in praise of gardening is necessary. The members of the Royal Horticultural Society take for granted all the virtues and attractions, and the popularity of their favourite pursuit, and they see no reason for wonder in the great numbers of its votaries and dependents. There is no need to speak here in apologetic terms of the project of the Royal International Horticultural Exhibition unless, indeed, to ask indulgence for the long title and possibly to deal gently with the word "Exhibition" which excites a sense of weariness in some minds.

There seems to be a growing appreciation of the advantages attending the holding of one-trade exhibitions, or exhibitions devoted to exploiting the products of a single branch of industry. This is a compliment to the shrewdness of the pioneers of the horticultural industry who initiated and have for many years indulged in the practice with increasing success. No one doubts that much of the popularity of gardening and of such commercial prosperity as the fates allow to horticulture, are due to the number of flower shows of varying degrees of importance held annually throughout the country.

Many of these flower shows have developed into important affairs, but not one has approached, in the British Isles, the great International Horticultural Exhibition of 1866. Although at first sight it seems surprising that no attempt has been made to repeat the great success of that show, those who have taken a part, however modest, in the organization of such an event can appreciate tolerably well the reason for such a long interval.

There have, moreover, been some special international displays during recent years at Paris, Ghent, Berlin, Haarlem, Florence, Lyons, Turin, and elsewhere, and one will take place in Russia in 1913.

Naturally each of these important affairs has presented some special and valuable lessons in horticulture, and English visitors have quitted them with a persistent feeling that the time has arrived for British gardeners once more to assert their supremacy and show the world the utmost of which they are capable.

The Flemish town of Ghent claims an important place in the history

of horticultural exhibitions. It is there that the Royal Society of Agriculture and Botany holds every five years great shows which date back intermittently for some 300 years. Visitors to the last show, held in 1908, will remember particularly the magnificent display of Azaleas, Camellias and Orchids, and the charmingly artistic effect of the arrangement of the exhibition with roomy walks and panoramic backgrounds. It may be claimed that English exhibitors scored a great triumph in the Orchid class by the marvellous display made by Sir GEORGE HOLFORD, K.C.V.O., C.I.E.

The relations between leading French and English horticulturists are of a very happy nature and many of the latter make a point of attending the periodical shows in Paris which always add to one's admiration for the artistic and decorative genius of our neighbours.

The completeness of the Berlin Exhibition in 1909, which was held as early as April, was a revelation to English visitors. The show of fruit for such a time of the year was surprisingly good.

A wonderful show of tulips was seen at last year's Jubilee Exhibition at Haarlem, where the great bulb gardens, for which the town is famous, were to be seen in masses—a galaxy of beauty in form and colour.

The chief characteristic of our own Exhibition of 1912, at the end of May, will probably be the all-round quality of the exhibits rather than the supremacy of any one class, except perhaps Orchids. Some few objections, by the way, may be raised to the date of the show, but these would be possible whatever season was fixed, and the days decided upon after the most careful consideration by the Directors are undoubtedly the most convenient generally and offer the best all-round opportunities for the display of British horticulture in all its branches. It has also been proved by experience on many occasions that the public are more eager to attend spring shows than those held later in the summer.

The dear old phrase "Horticulture in all its branches," falls very easily from one's lips. This is not to be wondered at considering the amount of oratory for which it has been responsible since the days of GERARD and PARKINSON. It would be useful sometimes to consider what it really means instead of employing it in the automatic fashion to which we have become accustomed. As the Exhibition is designed to serve horticulture in all its branches it will be legitimate to give a moment's consideration to some of the branches and see how broadly they spread.

Many of us are too busy clinging to our own particular limb to realize of what a giant tree it forms part and the great economic importance of that tree in our country.

We ought to be in an exceptional position to appreciate these facts when we have before us the statistics of the census of production with regard to the horticultural industry which will very shortly be published and should be well worth the study of all who are interested in the progress of the art.

Taking first a branch of great interest to the members of this Society, we should look for particulars of the great nursery, flower, bulb, and seed trades. Incidentally, we might hope to learn the extent of the acreage of the most highly or intensively cultivated land to be found in the country, and we might estimate roughly therefrom the number of employes occupied and maintained in the handling of these great industries.

Well organized though they may be, thanks in a great measure to the Royal Horticultural Society, these trades represent in volume, however, but a small proportion of the horticultural industry in full, or even of that part concerned with the management of gardens.

To realize this, we need only picture the comparatively few gardens we know personally, and think of the quantity and value of the materials used in their construction and maintenance, the architectural features and adornments in conservatories, horticultural buildings, garden ornaments, fencing and gates, the varied machinery, implements, tools, manures, fertilizers and all other details which represent some branch or other of the craft.

Among other points of information we might glean from the census some idea of the number of owners of private gardens of a considerable area and how many thousands of acres of land in this country are devoted altogether to gardens and parks, both public and private, or compare the area of glass-covered land now existing in the country with that of fruit and market gardens.

In these days of small-holdings, innumerable market gardens, and fruit farms, it is difficult to say exactly where horticulture begins and agriculture ends, and it is not unlikely that the latter industry will be credited in the census returns with a large share of these, the most extended branches of the tree of horticulture. This point will be noted by those anxious to assert on behalf of the art all the importance that rightly belongs to it.

In short, an ideal census of the productions of horticulture in all its branches would contain statistics concerning nurserymen, seedsmen, and florists, vegetable and fruit growers, in field and under glass, wholesale and retail distributors, manufacturers of horticultural buildings and the many accessories required for the maintenance of gardens, professional gardeners, artisans, and labourers. We must not forget the scientific, literary and artistic professions and crafts which influence so greatly the practice and popularity of the industry and do so much to initiate trade and employment.

There is little doubt that it would be possible to extract from a comprehensive census of horticultural production a strong case for the formation of a special Department of Horticulture subordinate to the Board of Agriculture devoted to the consideration of the interests of the former. A decision to this effect by the Board of Agriculture would be an appropriate coincidence with the great demonstration which the horticultural industry is preparing for next year.

I have laboured somewhat this question of the economic importance

of horticulture in the aggregate because this special side of what is generally called "gardening" does not often receive the attention it deserves.

One of the greatest assets that horticulture possesses is the unceasing sympathy shown by the Royal Family in its welfare.

This sympathy is respectfully reciprocated, and the pleasure with which the Directors received KING GEORGE'S gracious promise to open the Exhibition on May 22 next, at 12 o'clock, will be shared by all who are interested in the success of the Exhibition.

The considerable difficulty in securing a suitable site was eventually overcome by an arrangement to occupy 25 acres of the grounds of the Royal Hospital at Chelsea, which include the Ranelagh Gardens.

The position is ideal in many respects, among its advantages being two ample entrances from Queen's Road and the Chelsea Embankment respectively within a few minutes' walk from Sloane Square station.

There is open space for tents covering nearly 6 acres, and there are in addition several broad shaded avenues and the sheltered and mature gardens, which offer a good example of Middle Victorian landscape gardening and will make a perfect background for outdoor exhibits and the rock and water gardens, which are expected to be of particular interest.

It is proposed to illuminate the grounds and engage the best military bands available, so that given fine weather, a series of delightful floral fêtes will be feasible.

A provisional plan of arrangement has been issued and it is the determination of the Directors that there shall be no avoidable cause of complaint in matters of ventilation and space in the gangways. In this respect I may mention that the largest tent, which will cover nearly 4 acres, is divided into 5 spans, 45 feet in height, with special ventilation for the whole length of each ridge—the total length of the tent being about 220 yards. The gangways are from 15 to 20 feet wide. The show space in this tent amounts to nearly 100,000 square feet and will provide, if necessary, table run of nearly half a mile.

It is necessary to state that the tenancy of the premises will be too short to allow the production of an artistic scheme to compete on equal terms with the permanent sites of some Continental exhibitions, but at salient points, striking effects will be produced from views of the great expanse of flowers, and the general arrangements will be much less complicated than are usually found at such exhibitions. It may be mentioned that the 1866 Exhibition was held on the site now occupied by the Natural History Museum at South Kensington, adjoining the premises then occupied by the Royal Horticultural Society.

Experience has proved—fortunately in realms other than of horticulture—the folly of entering upon such an enterprise without ample financial guarantees.

We are happy to state that the support already accorded, both in the matter of guarantees and subscriptions, has been more than encouraging, so that with a continuation of existing experiences, the

anxiety of the Directors with regard to finances should be reduced to vanishing point.

This is not to say that guarantees and subscriptions are no longer earnestly invited. They are still wanted—and may be confidently expected in view of the substantial privileges which are offered in return. A subscriber is in effect the prudent person who buys a ticket or tickets beforehand at a cheap rate and at the same time is entitled to the happy feeling that he is becoming the patron of a most worthy cause. This would of course be an ungracious way of describing the liberality of many donations, among which may be mentioned that of your own great Society, to the amount of £1000, with a further guarantee of £4000. From all appearances there is little need to worry about the guarantee.

It is worth noting that £1000 represents an average contribution of about 1s. 6d. for each Fellow of the Society. In return for this, the reduction of the charge to Fellows is 25 per cent. to 50 per cent. on the first day which may be looked upon as a subscriber's day, and of 50 per cent. on all days other than shilling days; that is to say, in return for the 1s. 6d. a head, an average value of £1 7s. in tickets is given, thus showing a gain of £1 5s. 6d. a head, calculated on the whole number of Fellows, who, I think, may congratulate their Council on having achieved another of those strokes of business which do so much to popularize the Society.

The published lists of guarantees and subscriptions on November 21, 1911, are approximately £16,000 and £4000 respectively.

The Directors have recognized the desirability of encouraging the attendance of professional gardeners and have, therefore, reduced the charges of entry very considerably to this class of visitor.

The Directors have been assisted immensely in all of their work of organization by the systematically kept records of the 1866 Exhibition and the balance sheet has also been a continual source of reference. We find that the expenses of that Exhibition amounted to something over £12,000 the final profit being about £3500. This substantial sum was exhausted in making a donation to the Gardeners' Royal Benevolent Institution and in the purchase of the valuable Lindley Library, which is such a cherished possession of the Royal Horticultural Society.

Needless to say, the expenses of 1912 must be considerably greater.

Putting aside other considerations, this would be easily understood by examining the respective Schedules for 1866 and 1912.

In order that I might have an authoritative statement on this subject, I asked Mr. HARRY J. VERTCH (who, as is well known, is the only surviving member of the Committee of the 1866 Exhibition) to be so kind as to supply me with a few notes in his capacity of Chairman of the Schedule Committee for 1912.

Mr. VERTCH says it is not easy to compare the two Schedules.

There were 220 classes in 1866, against 428 in 1912. Exhibitions

in groups as such were practically unknown in 1886: all classes specified the number of plants to be staged.

For 1912, the applications for spaces for groups already number no fewer than 100.

In 1866 the largest class for Stove and Greenhouse plants comprised sixteen plants. This is in striking contrast to the requirements for next year.

The Orchid classes have grown from nine in 1866, the largest class being fifty plants, to twenty-nine classes with two groups each of 500 square feet.

The prizes offered for Roses tell the tale of the development of that favourite flower, for besides the novelty classes there are twenty-six classes against eight in 1866. In the last Exhibition the largest class was for twenty Roses in pots 8 inches across—in 1912 prizes are offered for groups not exceeding 500 square feet. We have nine classes for cut Roses against one class in 1866, and so on throughout the schedule.

These figures tell in brief the development of horticulture since 1866 and of the advance particularly in specialization which is such a great feature to-day.

It may be noted that Rock and Water Gardens were not seen in 1866, nor many of the handsome florist's flowers as we know them to-day.

While on this subject we may mention that applications for space for Collective Exhibits have come in from several foreign countries as well as from individual counties in Great Britain and that the entries already exceed 400, irrespective of the exhibitions of horticultural sundries. The last section promises to be the most complete and interesting that has yet been seen.

It is not desirable for me to give particulars of the exhibits already entered, but I am at liberty to mention for one thing that a commission has been given by an American gentleman for a very remarkable piece of garden statuary on the express condition that it is shown at the Exhibition.

No special prizes were offered in 1866, whereas already about fifty very fine cups and awards have been promised, in addition to the special cups given by many counties. It will not be invidious to inform Fellows of your Society that, in addition to the cup graciously promised by the KING and the one offered by the President of the Exhibition, the DUKE OF PORTLAND, others are being given by Sir TREVOR LAWRENCE, Sir GEORGE HOLFORD, Sir JEREMIAH COLMAN and Mr. GURNEY FOWLER, the last two gentlemen being respectively the Treasurer and Chairman of the Exhibition. The total prize list will probably exceed £4000.

There are many more matters of interest to which there is no time to refer, but the work of the Science and Education Committee should be mentioned, because it is hoped that this will be one of the most efficient and permanently valuable features of the Exhibition. It is

only necessary to point out that the Chairman of the Committee is the Right Honourable A. H. DYKE-ACLAND, P.C., who is throwing the greatest energy into the work and that the Secretary is Mr. F. J. CHITTENDEN. A glance through the list of distinguished men forming the Committee will complete the feeling of assurance upon the question of the efficient work to be expected.

Their labours are divided into two parts, one dealing with horticultural education and the other with the scientific side of horticulture.

There will be no exhibits in connexion with education, but a special building has been allotted to the scientific exhibits and will contain some highly valuable and interesting exhibits under the following sections:—

- (1.) Vegetable physiology.
- (2.) Genetics.
- (3.) Economic entomology.
- (4.) Economic mycology.

It may be added that many of the leading investigators on the Continent and in America have also promised their assistance.

All scientific exhibits will have a bearing on practical horticulture, so that this department of the Exhibition will be of popular interest and not merely a happy hunting-ground for the scientific student or a place of refuge for those who are seeking a quiet spot.

The Conference, which will be held in the fine Recreation Hall at the Hospital, will be devoted to two subjects, since it has been determined by the Committee, wisely, it will probably be agreed, that it is much better thoroughly to thrash out two subjects only than to rush frantically through hosts of lectures which no one has time to listen to, much more to criticize.

I may mention that there were something like forty or fifty papers presented at the Congress of 1866 dealing with subjects, many trivial and uninteresting.

The first subject for consideration will be the broad question of horticultural education. In preparation for this discussion, the committee is making thorough inquiry into the system of education in horticulture in this country and the public and private facilities which are open to students.

It is hoped that an exhaustive report will be completed and ready for placing in the hands of those who attend the Conference to serve as a basis for discussion. Many prominent educationists from the Continent and America have undertaken to assist in the discussion, or to read papers dealing with special points on horticultural education in their own countries.

Among them are Professor Bailey of Cornell University, and Professor Dr. Wittmack, of Berlin.

The second part of the Conference will deal generally with legislation in connexion with plant diseases. Information on this important subject is being obtained both in this country and abroad and will serve

as a basis for a report to be presented to the Conference on lines similar to those proposed in connexion with education. Many prominent people in this country and from abroad have undertaken to participate, and the Board of Agriculture have promised maps showing the progress and distribution of certain plant diseases and pests which it has been deemed advisable to legislate against.

One of the most pleasant and at the same time the most onerous duties in connexion with the Exhibition will be the entertainment of the many distinguished foreign guests who will undoubtedly visit this country next May. The Reception Committee is under the chairmanship of Sir ALBERT ROLLIT and a programme is being drawn up for the entertainment of our visitors, which is being simplified by the hospitality already promised from private and other sources. The President of the Exhibition, the DUKE OF PORTLAND, has generously offered to hold a reception at his town house. Permission has been graciously given for a visit to the Royal gardens at Windsor. The distinguished PRESIDENT of your Society in his private capacity, Mr. LEOPOLD DE ROTHSCHILD, The ROYAL HORTICULTURAL SOCIETY, and others have also intimated their hospitable intentions. If the history of 1866 were to repeat itself there would be a great banquet at the Guildhall. There should be little fear that the British gardeners who have visited foreign exhibitions and enjoyed the hospitality offered them will feel any shame at the way their former hosts are treated on their arrival in this country.

I cannot do better than conclude my remarks by quoting, by permission, some opinions with which I have been favoured by one or two foreign gentlemen intimately connected with the management of their own international horticultural exhibitions.

Herr SIEGFRIED BRAUN, the Secretary of the Berlin Exhibition in 1909 writes:—

“ Much could be said in a general way on this subject, but if you wish to know what tangible advantages for the horticultural industry of my country resulted from the International Horticultural Exhibition of 1909, I personally believe that one cannot value them too highly.

“ An exhibition, such as the one which took place in Berlin, affords to the experts in their many-sided interests lasting inducements to further efforts. It shows clearly what has already been achieved and what there is still to learn. This knowledge is in itself a powerful lever to progress in any profession. Besides, such an exhibition stirs up the gardening enthusiasm of both professionals and amateurs and induces them to spend more money on plants and flowers, thus conferring an added blessing on the industry.

“ It is as instructive as it is interesting to follow up how far these results sometimes reach in isolated cases.

“ I trust that your proposed exhibition for the year 1912 may be the means of bringing tangible profits to your country.”

Monsieur ABEL CHATENAY, the general secretary of the French Agricultural and Horticultural Committee, says:—

“ I have had the opportunity of noting personally how far International exhibitions have had influence in business relations between the countries taking part. The small number of your English colleagues who have taken part in our exhibitions could testify sufficiently as to the results obtained by the growers of Sweet Peas and Carnations and a few other specialities, by virtue of the excellence of their products and through their exhibits, for they have obtained numerous orders from the Parisian public.

“ I consider from another point of view that it is beneficial for horticulturists of various countries to be able to get into touch with their colleagues. It is impossible for questions of general interest to be limited by geographical frontiers and professionals from the various countries should be able to exchange their views from time to time. It is only in a large exhibition where they can meet and know one another either as jurors or as exhibitors. The interchange of ideas is of great interest to all.

“ From this point of view Belgian horticulturists, who are excellent exporters, have realized fully the utility of such manifestations, of which their quinquennial show at Ghent is a good example.”

The present secretary of the Ghent Society, to which I have so frequently referred, is Monsieur ALBERT CEUTERICK, and he has favoured me with the following views:—

“ One cannot fully define the immediate effects of our exhibition on the horticulture of Belgium, but our society which for a century has not relaxed its efforts to develop and improve these demonstrations of the horticultural industry is convinced that the result is of incalculable profit to the producers.

“ With this view our society and our horticulturists impose heavy sacrifices upon themselves to make them succeed.

“ Horticulture is a subject specially appropriate for exhibitions, but our exhibitions, by their importance and their fame, attract to Ghent the chief botanists, and amateur and professional gardeners of Europe. Some come as judges, others to satisfy their curiosity and to follow the progress of horticulture.

“ Existing commercial relations are confirmed and new connexions are created. Firms which exhibit make the acquaintance of numerous foreigners and widen their outlook.

“ In one word, it is an advertisement of extraordinary importance and it is not necessary nowadays to insist upon the value and advantage of advertisement, although its effects are not immediately apparent. Nevertheless, it is our profound conviction that the development and prosperity of our horticulture are intimately bound up with our quinquennial exhibition.

“ You are good enough to suggest that my efforts had something

to do with the success of the exhibition in 1908. May I say that the success of all of our exhibitions, of which our society is very proud, is to be attributed not to the individual efforts of one member or another but in the perfect union which has existed from time immemorial, first between all the members of the committee and then between the committee and all the horticulturists in our country."

These last words of Monsieur CEUTERICK deserve letters of gold and present an ideal worthy of emulation by everyone connected with the Royal International Horticultural Exhibition.

It would be premature to boast, but there is every reason to believe that, when the history of the great enterprise of 1912 is recorded, a verdict equally creditable to British horticulture may be inscribed.

ORIGIN AND HISTORY OF OUR GARDEN VEGETABLES AND THEIR DIETETIC VALUES.*

By REV. PROFESSOR GEO. HENSLOW, M.A., F.L.S., V.M.H.

VI.—KITCHEN HERBS.

ANGELICA.

THIS is not our English *Angelica sylvestris*, L., but an allied species, *A. Archangelica*, L., an occasional outcast of gardens, and a native of Iceland and Norway (Gerard), as well as other European regions. Gerard says it was very common in gardens in his time (1597). Like other strongly scented plants it was regarded as a preventive against the plague. He says it was eaten, except by Icelanders, in times of scarcity. At the present day ring-like sections of the green stem are preserved in sugar and used to adorn cakes, &c. The leaves have been eaten like celery as a vegetable, and the fruits are employed in flavouring some cordials, as Chartreuse.

ANISE.

Anise (*Anison* of Dioscorides and *Anisum* of Pliny) was well known to the ancients. It is said to have been found wild in "Candy, the best, and the next in Egypt." (Turner, 1548.) It is now known botanically as *Pimpinella Anisum*, L. Besides its sixty-one remedies referred to by Pliny—"being taken in wine, either raw or boiled for the stings of scorpions. . . . Both green and dried it is held in high repute as an ingredient in all seasonings and sauces, and is also placed beneath the undercrust of bread." The leaves are now occasionally used for seasoning, and for flavouring cordials, as the fruit contains about 2 per cent. of an essential oil (Church).

BALM.

The botanical name of balm is *Melissa officinalis*, L., from the Greek word for a bee—doubtless in reference to its honey. It is a native of Middle and South Europe and West Asia, but only naturalized in England. It smells strongly of lemon, is carminative and stomachic. The leaves have been employed in claret-cup and "balm wine." It is also used in certain liqueurs and perfumes. It was well known as a drug-plant in the sixteenth century and called Bawme, and in Italian *Cedronella*, from the citron-like smell. Dodoens (1578) observed, "If a man put Bawme into Bee-hives, or else if the hives be rubbed therewithal, it keepeth Bees together, and causeth other Bees to resort to their company."

* Previous articles in this series have appeared as follows:—Vol. xxxiv. pp. 15-23, vol. xxxvi. pp. 115-126, 345-357, 590-595, and vol. xxxvii. pp. 108-114 and pp. 313-320.

BASIL.

Two species of basil are cultivated, the "Bush Green" and the "Sweet Green," the former is *Ocimum * minimum*, L., and the latter *O. Basilicum*, L., both being natives of India. They were introduced into England in 1573 and 1548 respectively.

The sixteenth-century herbalists, as well as Tournefort (1730), only refer to its supposed medicinal virtues, which Parkinson is inclined to consider to be of little value (1640).

At the present time the leafy shoots, being strongly scented, are used for seasoning.

BORAGE.

This plant was probably known to the ancients under the Greek and Latin name for "Ox-tongue" (*Bouglōssos* and *Buglossa*). The following remark of Pliny most probably refers to Borage, "the main peculiarity of this plant is, that if put into wine, it promotes mirth and hilarity, whence it has obtained the additional name of *euphrosynum*," i.e. 'promoting cheerfulness.' The present Latin name is *Borago officinalis*, L.

Gerard (1597) observes: "Those of our time do use the flowers in salads to exhilarate and make the mind glad, to the comfort of the heart and driving away of sorrow."

It is still employed in claret-cup, &c. It is a common roadside weed in Malta, and extends from Middle and South Europe to West Africa.

BURNET.

Garden or salad Burnet is botanically *Poterium Sanguisorba*, L. The name is derived from the Latin word *poterium*, a goblet, as the foliage, tasting somewhat like cucumber, was put into the so-called "cool tankard."

In the sixteenth century the Burnet was called *Pimpinella* or *Bipennula*, from the two rows of leaflets. One botanist, Gesner, suggested it should be called "*Peponella*, because of its smell like Melons or Pompions, to which it is like." Besides several medicinal uses, Gerard says, "The leaves of Burnet steeped in wine and drunken, doth comfort the hart, and maketh it merrie."

CARAWAY.

Carum Carui, L., is not a native, but is occasionally naturalized from cultivation. Hooker gives its distribution as Northern Europe, North and West Asia, and Himalaya. Gerard says that "Caruwaies grew almost everywhere in Germanie and in Bohemia; and took its name from Caria, where Dioscorides said it grew. The seeds are confected or made with sugar into comfits." Besides possessing

* The ancient herbalist distinguished between *Ocimum* and *Ocymum*: as the latter name was given by Tragus to the Buckwheat, from its rapid germination, *ōkus* in Greek meaning "quick."

medicinal virtues, we use them now for cakes; but in the sixteenth century it was written, "the stalkes, when they come first up, are wonderful pleasant, eaten in a sallet unsodden. And the herbe serveth to make swete and well savored potage" (Turner, 1578). The fruits, "caraway seeds" of commerce, contain an essential oil and are now used for flavouring cakes, confectionery and cordials.

CHAMOMILE.

This familiar domestic drug-plant (*Anthemis nobilis*, L.) used as a "tea" for its tonic properties, is a native, chiefly round the coasts. The flower-heads of the cultivated "double" form are used, the wild being too bitter. The aromatic scent is due to an essential oil; but as the "single" heads are stronger in this respect, this is the form employed in medicine.

The "Wild Chamomile" belongs to a different genus, being *Matricaria Chamomilla*, L. Though not used here, it is on the Continent.

CLARY AND SAGE.

Salvia Sclarea and *S. officinalis*, both South European plants, and cultivated for seasoning. Gerard (1597) describes and figures several species, besides our two English Salvias under the names *Gallitricum* and *Horninum*. It was called Clecrecie because, "The seede of Clarie poudered, finely scarced [sifted or cleansed] and mixed with honie, taketh away the dinnesse of the eies and cleereth the sight."

With onions, &c., sage forms a well-known "stuffing."

CORIANDER.

Coriandrum sativum, L., is wild in South Europe, but has long been cultivated. It will be recalled that the manna was described as round like coriander seed. The fruit, unlike that of most of the members of the Umbellifer family, is globular and not elongated, as in caraway, &c. It is aromatic, like so many others, and has been used for flavouring salads, soups, &c., as well as liqueurs, and in confectionery.

DILL.

Anethum graveolens, L. Wild in Spain and South Europe, this has long been used as a condiment. Taylor, who first translated the Bible into English in the sixteenth century, made an error in writing "Anise" for Dill (in Greek it is *Anethon*). At the present day Dill is used as "Dill Water" for infants, as well as occasionally in soups, sauces and pickles, &c.

FENNEL.

Foeniculum officinale, All., is a native of our coasts from North Wales to Cornwall, and from Norfolk to Kent; and from South Europe to India. In Malta there is a xerophytic variety, with more rigid and pointed leaf-segments, as well as the normal form. The name is

from *fenum*, hay. It was well-known to the ancients, Pliny according twenty-two remedies to it. He observes that serpents taste it "when they cast their old skins, and that they sharpen their sight with the juice by rubbing against the plant."

Together with the St. John's-wort, it used to be hung over doors to warn evil spirits. Like several other Umbellifers, it is carminative, as is Dill, and was used in several drugs in the Middle Ages. Gerard (1597) only refers to medicinal uses. Parkinson (1640) appears to think that its culinary use was derived from Italy; for he says:—"The leaves, seede and rootes are both for meate and medicine; the *Italians* especially doe much delight in the use thereof, and therefore transplant and whiten it, to make it more tender to please the taste, which being sweete and somewhat hot helpeth to digest the crude qualitie of Fish and other viscous meats. We use it to lay upon Fish or to boyle it therewith and with divers other things, as also the seede in bread and other things."

HOREHOUND.

Marrubium vulgare, L.—The common or white Horehound is a native, but also widely dispersed over Europe. It was formerly used in various ways as a drug-plant, but is now only grown for a beverage and a remedy for coughs, and as a seasoning plant.

HYSSOP.

The modern Hyssop is *Hyssopus officinalis*, L., a native of South Europe. It was only used as a drug formerly, but now young shoots are sometimes employed as a pot-herb. It is often mentioned in the Bible, but it cannot for certain be known what Labiate it was. Probably more than one were used.*

ICE-PLANT.

Mesembryanthemum crystallinum, L., a native of the Canaries, is so called from the innumerable bladdery hairs filled with water which give the plant a frosty appearance. It is used for table decorations. It was first introduced in 1775. The generic name was given because it only flowers in great sunshine or the "middle of the day."

LAVENDER.

Lavandula vera (*Spica*, L.), a native of South Europe, and allied species, were well known to the ancients for their perfume, the name being derived from *lavo* to "wash," as it was used in baths. It was introduced in 1568. Its uses as a perfume are familiar to all.

MARJORAM.

Pot Marjoram is a shrubby species, *Origanum Onites*, L., of South Europe, *Onitis* having been both the Greek and Latin name. The Sweet Marjoram is *O. Majorana*, L., of North Africa. Both are used

* See *Plants of the Bible* (Bagster).

for seasoning and soups. The British species, *O. vulgare*, L., is also aromatic and has likewise been used.

MINT.

The garden mint, *Mentha viridis*, L., is a cultivated form of *M. sylvestris*, L., the Horse-mint, which is recorded as cultivated at Aleppo. Either *M. sylvestris* or some form approaching *M. viridis*, which is not known as a truly wild plant, was probably the mint of Scripture. It is a favourite plant in association with peas and in pea-soup.

PENNYROYAL.

This is *Mentha Pulegium*, L., a native of England and South Europe. It was formerly in great repute for its supposed medicinal virtues, and is still employed as a domestic remedy.

PARSLEY.

Petroselinum sativum, Hoff., is the common Parsley in Bentham's 'Handbook' and *Carum Petroselinum*, Benth., in Hooker's *Student's Flora*.* According to the former it is a native of Eastern Mediterranean regions, its old name being *Macedonicum*. De Candolle gives Turkey, Algeria, and the Lebanon.

The ancients distinguished between two plants under the name *Selinon*, one being the celery (*Apium graveolens*) and called *helioselinon*—i.e. "Marsh *selinon*"—and the other, our parsley, *Oreoselinon*, "Mountain *selinon*"; or *petroselinon*, meaning "Rock *selinon*." It was the last name from which Parsley is derived, for in the middle ages *Petroselinum* became corrupted into *Petrocilium*. This was Anglicized into *Petersylige* and *Petersile*. This became *Persylle*, *Persely*, and finally parsley.

In the sixteenth century the parsley was known as *Apium hortense*, but the herbalists retained, as the official name, *Petroselinum*. A variety *crispum* was grown, as it is to-day, being even mentioned by Pliny. Camerarius in 1588 calls it *Apium verum*, and says it was the plant which the ancients used for crowning the victors in the Nemean games and also for decorating tombs.

Linnaeus (in 1764) named it *Apium Petroselinum*, and gives Sardinia as its wild habitat.

It was not introduced into England before 1548. Several varieties now exist. No mention appears to have been made by the ancients or in the Middle Ages of the variety with an enlarged tap-root, but Miller in his Dictionary calls it "the large-rooted Parsley."† The tap-root grows to a considerable length and is $\frac{1}{2}$ inch in diameter, and under cultivation it has developed both a parsnip-like as well as a turnip-shaped form. Miller says (in 1771): "This is now pretty commonly sold in the London markets, the roots being six times as large

* Hence Bentham has not kept to his own name.

† His definition is "*Polis radicalibus trifidis, serratis; petiolis longissimis*"; which agrees with the parsley.

as the common Parsley. This sort was many years cultivated in Holland before the English gardeners could be prevailed upon to sow it. I brought the seeds of it from thence in 1727; but they refused to accept it, so that I cultivated it several years before it was known in the markets."

At the present day the "long white" and the "round sugar" forms, known as the Hamburg Parsley, are sold by seed-growers, being much esteemed for flavouring soups, stews, &c.

In England parsley is only found wild as an escape from gardens. It is used as a garnish and sauce, as well as fresh and dried for flavouring.

ROSEMARY.

Rosmarinus officinalis, L., is a south European plant of dry localities, as on rocky ground in Malta, and was well known to the ancients as a drug-plant. It was introduced in 1548 for making "Rosemary Tea" for nervous headaches. It was called *Libanotis* by Dioscorides from its perfume having some resemblance to that of frankincense. It is now used for seasoning as well as for its scent. Narbonne honey is said to derive its flavour from rosemary.

RUE.

Ruta graveolens, L., is a native of South Europe, and introduced in 1562. Being very strong-scented, it was regarded as an important medicinal plant. Pliny mentions some four score remedies, and it has been highly valued ever since, being still retained in our Pharmacopœa. Though the taste is exceedingly disagreeable to us, Pliny says that "the ancients held rue in peculiar esteem; for I find that honeyed wine flavoured with rue was distributed to the people in his consulship by Cornelius Cethegus." This plant, with others, was used as a preventive of the plague, and together with Southernwood was always put in front of the dock in former days to ward off jail-fever. Italians eat the leaves as a salad.

SAVORY.

Summer Savory is *Satureja hortensis*, L., and Winter Savory *S. montana*, L. They were introduced in 1562 from South Europe, e.g. Spain and Italy. They are used for flavouring.

TARRAGON.

Artemisia Dracunculus, L., is a native of Siberia. It has lance-shaped leaves with an aromatic flavour. It is used for sauce and salads, as well as in the making of Tarragon vinegar.

THYME.

The garden Thyme is an "improved" cultivated form of the wild Thyme of the mountains of Spain, *Thymus vulgaris*, L. var. *citriodorus*, and has a lemon scent. There is also a broad-leaved variety in cultivation. Thyme is used for stuffing, soups, and sauces.

POLLINATION OF HARDY FRUITS.

By C. H. HOOPER, M.R.A.C.

[Read before the Scientific Committee, October 24, 1911.]

THE experiments recorded were designed to gain information upon the following points:—(1) To what extent can our ordinary fruits set without the visits of insects to the blossoms? (2) To what extent fruit flowers set when pollinated with their own pollen, whether from the same flower, the same tree, or another tree of the same variety? (3) Do fruit blossoms, when pollinated with pollen from another variety, set fruit more plentifully and of better quality than when pollinated with pollen of the same variety?

Mr. W. E. S. ERLE DRAX most kindly gave me permission to carry out my trials in his garden at Olantigh, his gardener, Mr. BOND, kindly giving me information as to varieties, &c.

1. To test the effect of excluding insects, fine muslin paper bags were placed over unopened flower buds; where any flowers had already opened they were picked off. The bags were tied at the mouth with twine, with label giving date, variety, and number. After about three weeks, when the fruits outside had set, the truss inside the bag was examined and notes taken as to results, the bag was taken off, leaving label with notes, &c.

2. To test whether fruit blossoms set fruit when pollinated with their own pollen or pollen of the same variety, muslin or paper bags were placed over unopened blossoms, which were tied up and labelled. When the flowers opened the stigmas were dusted with pollen of the same variety either with a camel's hair brush or by the use of a pair of forceps taking the stamens from another flower, the anthers of which were shedding their pollen, and touching the stigmas with these anthers. In order to avoid mixing pollen, the brush was after use dipped in methylated spirit and dried before using again for other pollen, so four or five brushes were needed for work. After pollination the flowers were again bagged, the date of pollination added to the label, and in some cases a note of the number of flowers taken, with any note of injury by caterpillars or other point influencing results. Where the blossoms were not all open at once, as in gooseberries, currants, cherries, pollination was repeated; in some cases there were three separate pollinations. The bags were kept on for a fortnight or more after pollination; when the bags were removed, the labels saying what had been done were left on.

3. To test whether foreign pollen—*i.e.* pollen of another variety—gave better results than pollen of the same variety, unopened blossoms were bagged. Accepting the fact shown by experiments in the U.S.A. and by Mr. F. J. CHITTENDEN that most varieties will not set fruit

with their own pollen, when the flowers opened I took pollen from other varieties either by brush or by carrying the stamens with forceps, and dusted it on the stigmas of the bagged flowers without emasculation. The only variety that had all the flowers experimented upon emasculated before the anthers shed their pollen was a 'Cox's Orange' tree on which I tried pollen of nine different varieties of apple; but in two trials of 'Cox's Orange Pippin' pollinated with its own pollen, in neither case did fruit mature, and in five trials bagged and not touched none set any fruit. Emasculation would therefore seem unnecessary.

For these trials I used some 200 muslin bags, most of them of green colour and fine mesh, and about 100 paper bags as used by bakers and grocers. The season being dry the latter answered quite well and did not come ungummed. Green muslin bags were used for the sake of the appearance of the garden. The only insects I found in any of the bags to the best of my remembrance were caterpillars, apple sucker, and aphid, and sawfly in the young apples, the eggs of which must apparently have been on the flower buds when bagged. The results seemed similar whether in paper bag or muslin bag. With the fruits experimented on I think very little pollen is blown about, and none came through the muslin bags to affect results. Glazed, transparent paper bags may be the very best of all to use, and if I make further trials I propose using them to try and avoid possibility of error.

Gooseberries, Red, and White Currants.—Bags were placed over small boughs of unopened blossoms, with the result that very few fruits set, and those chiefly at the tip and at the base, where rubbed by the bags. The pollen of gooseberries and currants is sticky and cannot be transferred from the anthers to the stigmas without mechanical means, and these plants are therefore dependent on insects to do this office for them in order to set fruit. They are self-fertile—i.e. set fruit perfectly when pollinated with pollen of the same flower or same variety.

Cherries.—On some ten varieties of cherries on which unopened blossoms were bagged and left untouched, not a single fruit set; when pollinated with their own pollen several set, but none matured except on Morello cherries, whilst in the five cases in which I bagged and afterwards pollinated with pollen of another variety all set fruit. It appears necessary when growing cherries to have several varieties for cross-pollination and to have plenty of bees to carry the pollen.

Plums.—I made trials on eleven varieties of plums—viz.: 'Victoria,' 'Czar,' 'Rivers' Early Prolific,' 'Early Orleans,' 'Bittern,' 'Cox's Emperor,' 'Jefferson,' 'Denniston's Superb,' 'Pond's Seedling,' 'Greengage,' and 'July Greengage.' Of those bagged and left untouched, four varieties set fruit out of eleven, but only fruits of two varieties came to maturity—namely, 'Victoria' and 'Czar'—and these were not as large as others in the open.

Of those bagged and afterwards pollinated with their own pollen,

seven of the eleven varieties started by setting fruit, but only five matured—viz. 'Victoria,' 'Czar,' 'Denniston's Superb,' 'Bittern,' and 'Rivers' Early Prolific.'

Out of ten cross-pollination trials, I had good fruit mature on five (the pollen coming from the second named)—namely, 'Victoria' × 'Czar'; 'Victoria' × 'Denniston's Superb'; 'Rivers' Early Prolific' × 'Victoria'; 'Rivers' Early Prolific' × 'Denniston's Superb'; and 'Pond's Seedling' × 'Czar'; the fruit produced by the cross being generally larger than that where self-pollinated. All the varieties, except perhaps 'Victoria,' seem to set finer fruit more plentifully when pollinated with another variety.

With plums also it appears advantageous to grow several varieties for cross-pollination, and have bees in the neighbourhood.

Pears.—Whilst the pears were in flower in 1911 in Kent, although the weather was sunny and warm, the wind during most of the time was boisterous and too rough for hive and humble bees to work in, which accounts, I think, for the short crop of pears this year.

Out of twenty-two varieties of which I bagged blossoms and left them afterwards untouched, only 'Duchesse d'Angoulême,' 'Colmar d'Été,' 'General Todleben,' 'Dr. Jules Guyot,' 'Joséphine de Malines,' and 'Durondeau' set fruit; all the fruits, however, fell before maturity.

Of those blossoms bagged and pollinated with pollen of the same variety about the same number proportionately set, but only two kinds thus treated—viz. 'Duchesse d'Angoulême' and 'Colmar d'Été'—matured their fruit. I thought to have been able to include 'General Todleben' also as self-fertile, but the fruit withered after July 7. I did not make many cross-pollinations in pears, but apparently the pollen of 'Duchesse d'Angoulême' sets the fruit of 'Williams' Bon Chrétien' well, the pollen of 'Conference' that of 'General Todleben,' and vice versa.

In the case of 'Vicar of Winkfield' I bagged four buds and afterwards pollinated them with 'Winter Crasanne,' and had two fine pears, some of the best on a large tree, there being only about ten fruits, though plenty of blossom. This, I think, exemplifies the importance and value of pollination with another variety.

The twenty-two varieties of pears, of which flower buds were bagged and then left untouched, were: 'Joséphine de Malines,' 'Duchesse d'Angoulême,' 'Beurré Alexandre Lucas,' 'Durondeau,' 'Conference,' 'Clapp's Favourite,' 'Doyenné du Comice,' 'General Todleben,' 'Winter Crasanne,' 'Marie Louise,' 'Colmar d'Été,' 'Dr. Jules Guyot,' 'Margaret Marillat,' 'Beurré Diel,' 'Catillac,' 'Citron des Carmes,' 'Uvedale's St. Germain,' 'St. Luke,' 'Louise Bonne of Jersey,' 'Souvenir du Congrès,' 'Beurré Superfin,' and 'Pitmaston Duchess.'

Apples.—Out of sixty-three varieties of apples on which unopened blossoms were bagged and left untouched, the only fruit that set and matured was on 'Irish Peach,' and this was very good; of those

bagged and pollinated with their own pollen by brush or anthers the following set and matured their fruit: 'Irish Peach,' 'White Transparent,' 'Newton Wonder,' 'Ecklinville,' 'Summer Golden Pippin,' 'Baumann's Red Winter Reinette,' 'Peasgood's Nonesuch' (very fine), 'Christmas Pearmain,' 'King of the Pippins' (damaged by sawfly, eventually fell); 'Washington' and 'Adam's Pearmain' fell in June. I believe 'American Mother' and 'James Grieve' set with their own pollen, but am not quite certain.

In nearly all the crosses made, good fruits resulted; out of the sixty-four varieties crossed forty-eight were successful. Among the best may be mentioned: 'Brabant Bellefleur' with pollen of 'Beauty of Bath,' 'Gladstone' with 'Beauty of Bath,' 'Alfriston' with 'Beauty of Bath,' 'Allington Pippin' with 'Summer Golden Pippin' (the finest on tree), 'Grenadier' with 'Seaton House,' 'Hoary Morning' with 'Seaton House' and vice versa. 'Christmas Pearmain' with 'Cox's Pomona,' 'Mère de Ménage' with 'Lady Sudeley,' 'Sandringham' with 'Hornead Pearmain,' 'Beauty of Bath' with 'Summer Golden Pippin,' 'High Cannons' with 'Grenadier,' 'The Queen' with 'Baumann's Red Winter Reinette,' 'Lane's Prince Albert' with 'The Queen,' 'Golden Spire' with 'Hollandbury' and 'Bismarck,' 'Cellini' with 'Graham's Royal Jubilee.'

These crosses were made without removing the stamens from the flowers, which were pollinated by brush or anthers; if the brush was used it was dipped in methylated spirits and allowed to dry before using with another pollen; but in the case of a tree of 'Cox's Orange Pippin,' nine bunches of unopened blossoms had their stamens taken out with forceps, and were pollinated by camel's hair brush or anthers with the pollen of nine different varieties of apple to try to find out which would give the best result. Fruit set with pollen of the eight following varieties, 'Bramley's Seedling,' 'High Cannons,' 'Grenadier,' 'Lady Henniker,' 'Golden Spire,' 'Duchess's Favourite,' 'The Queen,' and with its own pollen, only with 'Peasgood's Nonesuch' did fruit not set; however, all gradually fell before maturity except those pollinated with 'Bramley's Seedling' and 'High Cannons.'

The following is a list of apples experimented on:—*Self-fertile*: 'Irish Peach,' 'White Transparent,' 'Newton Wonder,' 'Ecklinville,' 'Summer Golden Pippin,' 'Baumann's Red Reinette,' 'Peasgood's Nonesuch,' 'Christmas Pearmain,' 'King of the Pippins,' 'Adams' Pearmain,' 'Washington,' 'American Mother,' ? 'James Grieve'? *Self-sterile* or, perhaps better, those that did not set or mature fruit with their own pollen in these trials: 'Allington Pippin,' 'Annie Elizabeth,' 'Alfriston,' 'Astrachan,' 'Beauty of Bath,' 'Belle de Pontoise,' 'Beauty of Kent,' 'Ben's Red,' 'Bismarck,' 'Blenheim Orange,' 'Brabant Bellefleur,' 'Cellini,' 'Cox's Orange Pippin,' 'Cockle Pippin,' 'Cox's Pomona,' 'Duchess's Favourite,' 'Egremont Russet,' 'Fearn's Pippin,' 'Gladstone,' 'Golden Noble,' 'Golden Spire,' 'Graham's Royal Jubilee,' 'Grenadier,' 'Hambling's Seedling,' 'High Cannons,' 'Hoary Morning,' 'Hollandbury,' 'King of

Tompkins' County,' 'Lane's Prince Albert,' 'Lady Henniker,' 'Lady Sudeley,' 'Loddington,' 'Lord Derby,' 'Lord Suffield,' 'Mère de Ménage,' 'Old Hawthornden,' 'Old Nonpareil,' 'The Queen,' 'Ribston Pippin,' 'Rival,' 'Graham's Royal Jubilee,' 'Sandringham,' 'Seaton House,' 'Stirling Castle,' 'Striped Beefing,' 'Sturmer Pippin,' 'Waltham Abbey Seedling,' 'Warner's King,' 'William's Favourite,' 'Worcester Pearmain.'

Strawberries seem to be less dependent on insect pollination than any other of our hardy fruits, though to these bees are probably beneficial, especially when during a dull, rainy season there are intervals when these insects can work.

To test the effect of excluding bees and other insects from strawberry blossoms, the frame of a hand light was placed over a strawberry plant, muslin was tied over this by a string round the upper rim of the frame. The weather during blossoming was fine, with a good deal of wind. The fruit set and matured on the enclosed plant practically as well as on those around in the open; muslin bags were also placed over unopened blossoms of plants of several varieties, but in general these set their fruit as well or nearly as well as those not enclosed. Apparently the movement of the wind carries the pollen from the anthers to the stigma of the strawberry flower in the open field or garden.

Raspberries and Loganberries.—Where these flowers were bagged in muslin the fruits set but were not generally so large or well developed as those in the open.

General Conclusions.—Fruit blossoms generally are dependent on the visits of insects, and from want of these many fruit plantations do not yield their best; bees are absolutely essential to gooseberries, black, and red currants, and very largely so to pear, apple, plum, and cherry, and where there are not hive bees near and but few wild bees one or more hives of bees should be placed in the plantation.

In the case of most varieties of apples, pears, plums, and cherries it is advantageous to have a different variety flowering at approximately the same time ever third or fourth row for better cross-pollination and consequent setting of fruit.

THE PARK AND GROUNDS OF VRANA.

ONE OF THE RESIDENCES OF HIS MAJESTY KING FERDINAND OF
BULGARIA.

[By H.M. special permission.]

By ALARICUS DELMARD, F.R.H.S., F.A.B.A., &c.

BEFORE describing, briefly, the Park of Vrana a few words concerning H.M. KING FERDINAND will undoubtedly be of interest to readers. Apart from his well-known and remarkable talents as statesman and diplomatist, those who have the great honour of conversing with HIS MAJESTY soon discover that he is a profound scholar, perfectly "au fait" with any subject that may crop up, and in addition of a most sympathetic disposition. The latter quality is also shown in HIS MAJESTY's great love for nature; he is a keen practical gardener, and possesses a profound knowledge of botany and of the nomenclature of plants, especially in the branches of alpine flora and arboriculture.

Of Alpine plants and Coniferae, HIS MAJESTY has probably one of the finest collections in Europe, and is also, as is well known, a distinguished zoologist and ornithologist.

Vrana is situated on the plain, watered by the river Isker, between Mount Vitosh and the western extremity of the Balkans, at a distance of twelve kilometres (about eight miles) from Sophia.

The excellent carriage road from Sophia to Vrana passes through a now highly cultivated country, which a few years ago was an arid plain. Pasture and well-stocked and tended farmlands extend the whole way, on both sides of the road, owing entirely to the enterprise of, and encouragement and example given to agriculture by H.M. THE KING.

Vrana itself is a striking example and object-lesson to the people of Bulgaria, and many others, of what energy and perseverance can do; for in the short space of ten years an absolutely uncultivated and treeless tract of land, some 400 acres in extent, has been transformed into a spot of exquisite beauty and richness of vegetation.

Climatic conditions are a somewhat serious obstacle to horticulture in the plain of Sophia, which lies at an altitude of 500 metres (1600 feet) above sea-level, and suffers a range of temperature from -22° C. for the winter to $+35^{\circ}$ C. in the summer, when violent hail and thunderstorms are extremely frequent.

The park and gardens consist of meadows, woods, plantations, and shrubberies, interspersed by open glades and gardens, which, in spring, summer, and autumn, are a perfect glory of colour.

From the main entrance a broad drive between plantations of firs and larches, and bordered by graceful birches (*Betula alba*), winds



FIG. 139. THE LILY POND AT VRANA.

(*To face p. 53c.*)

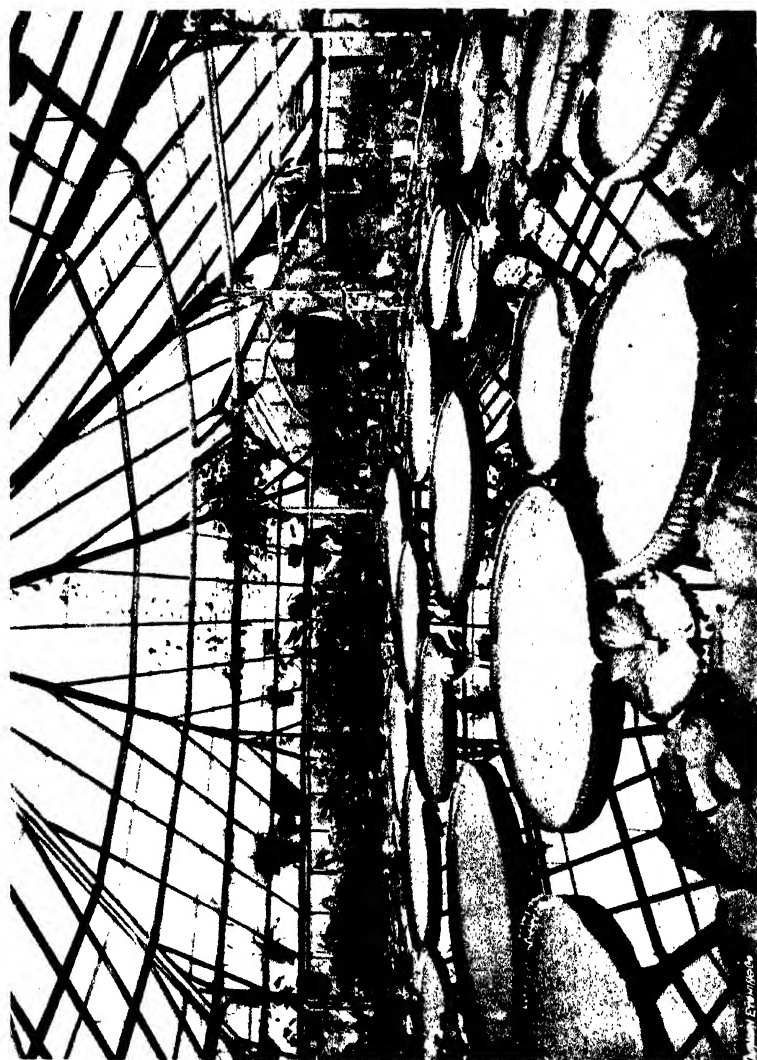


FIG. 140.—THE VICTORIA HOUSE AT VRANA.

to the beautiful palace, a building of Oriental type of architecture. From the main drive, branch off others, in addition to innumerable winding paths, leading through the plantations and copses to lovely open spaces of flower gardens, unexpected rock gardens full of rare collections of alpine plants from all parts of Europe and Asia Minor, and large lawns, in one of which is the lily lake, which contains a magnificent collection of aquatics, and the banks of which are bordered by a luxuriant growth of sub-tropical and temperate plants.

This lake, when in full luxuriance of vegetation and blossom, is a sight not to be forgotten; the thousands of *Nymphaea* flowers of every shade of colour, the beautiful long-stalked Nelumbiums, with their exquisitely-formed and graceful blue-green foliage, the enormous curiously armed leaves of *Euryale ferox*, the many masses of tall *Papyrus antiquorum*, and the small islands, with their tangled growth of creepers and tropical foliage plants, transport the beholder to some quiet backwater in the upper reaches of a tropical river, without any of the annoyances of alligators, insect bites, and fevers.

Many of the sub-tropical and even some tropical aquatics have become acclimatized, and with a little protection have resisted the rigours of the Bulgarian winter.

There is a fine range of hothouses in the park, including a large *Victoria Regia* house; and the "nurseries" for conifers and other trees contain large, interesting, and valuable collections, which are continuously being added to from all parts of the world, and amongst them may be noted a great and rare collection of the genus *Salix*.

A brief list of some of the most noteworthy specimens of Coniferae, all of which are fine examples of their kind, and picturesquely grouped in the park, is here given.

<i>Abies arizonica</i>	.	.	.	.	Arizona.
„ <i>balsamea</i>	.	.	.	.	N. America.
„ <i>concolor</i> = <i>A. lasiocarpa</i>	.	.	.	.	California.
„ <i>concolor violacea</i>	.	.	.	.	California.
„ <i>firma</i>	.	.	.	.	Japan.
„ <i>grandis</i>	.	.	.	.	California.
„ <i>Nordmanniana</i>	.	.	.	.	Crimea, &c.
„ <i>pectinata</i>	.	.	.	.	Europe.
„ <i>Pinsapo</i>	.	.	.	.	S. Spain.
„ <i>sibirica</i>	.	.	.	.	Siberia.
<i>Chamaecyparis Lawsoniana</i>	.	.	.	.	N. California.
<i>Juniperus Sabina</i>	.	.	.	.	S. Europe.
<i>Larix europaea</i> = <i>L. pyramidalis</i>	.	.	.	.	Europe.
„ <i>leptolepis</i> = <i>L. japonica</i>	.	.	.	.	Japan.
„ <i>sibirica</i>	.	.	.	.	Siberia.
<i>Picea ajanensis</i>	.	.	.	.	Japan.
„ <i>Engelmanni glauca</i>	.	.	.	.	Rocky Mountains.
„ <i>pungens argentea</i>	.	.	.	.	Rocky Mountains.
„ <i>pungens glauca</i>	.	.	.	.	Rocky Mountains.

<i>Pinus excelsa</i> var. <i>Peuce</i>	. . .	Himalaya.
„ <i>densiflora</i>	. . .	Japan.
„ <i>halepensis</i>	. . .	Levant.
„ <i>Jeffreyi</i>	. . .	California.
„ <i>Laricio austriaca</i>	. . .	Austria.
„ <i>Lambertiana</i>	. . .	California.
„ <i>Strobus</i>	. . .	N. America.
„ <i>Thunbergi</i>	. . .	Japan.
„ <i>ponderosa</i>	. . .	California.
„ <i>sylvestris</i>	. . .	Europe.
<i>Pseudotsuga Douglasii glauca</i>	. . .	N. America.
<i>Taxus baccata</i>	. . .	Europe, India, &c.
„ <i>hibernica</i>	. . .	Ireland.
<i>Thuja gigantea</i>	. . .	N.W. America.
<i>Thuyopsis dolabrata</i>	. . .	Japan.
<i>Tsuga canadensis</i>	. . .	N. America.

Of the various plants cultivated in the lily lake the following may be mentioned:—*Euryale ferox* from Southern China. Of the tropical Nymphaeas, the blue-flowered species, *Nymphaea pennsylvaniana*, *N. pulcherrima*, *N. stellata*, *N. zanzibariensis azurca*, *N. caerulea*; the white day-flowering *N. gracilis*; the rose-coloured day-flowering *N. zanzibariensis rosea* and *rubra*, two of the most beautiful of this exquisite family; a yellow day-flowering *N. pygmaea helvala* from Japan; some only expand their blossoms until noon, such as the rose-coloured *N. Deamiana*, *N. Lotus* ‘Jubilee,’ probably a hybrid, and *N. Bisetii*, and the white *N. Lotus*, *N. dentata*, and *N. dentata superba*. There are also the red and dark red Nymphaeas ‘Hofgärtner Gräbner,’ *kewensis*, *O’Murana*, and *Ortgiesiana rubra*.

Amongst the hardy ones may be noted *Nymphaea alba*, white; *N. atrosanguinea*, dark rose; *N. ‘Aurora,’* a beautiful orange; *N. Laydekeri* var. *purpurea*, carmine, from Japan; *N. lucida*, rose colour; *N. Marliacea chromatella*, a rich yellow; *N. Marliacea rosea*, rose; *N. odorata minor*, white; *N. sulphurea*, yellow; *N. sphaerocarpus*, white and rose; and *N. sphaerocarpus Froebeli*, a fine dark red; and *N. Robinsonii*, cinnamon.

The lake contains many hardy aquatics from every part of the globe. Of the most interesting as thriving together are:—

<i>Acorus japonicus</i> fol. var.	. . .	China.
<i>Aponogeton distachyon</i>	. . .	Cape of Good Hope.
<i>Arundo Donax</i> and fol. var.	. . .	S. Europe.
<i>Butomus umbellatus</i>	. . .	England.
<i>Callia palustris</i>	. . .	Gt. Britain, &c.
<i>Hibiscus palustris grandiflorus albus</i>	. . .	N. America.
<i>Hibiscus palustris grandiflorus</i>	. . .	„
<i>carneus</i>	. . .	„

<i>Hibiscus palustris grandiflorus</i>	
<i>roseus</i>	N. America.
<i>Iris Kaempferi</i> = <i>I. laevigata</i>	Siberia and Japan.
<i>I. sibirica</i>	Europe, Siberia, &c.
<i>I. Pseudacorus</i>	Europe, Western Asia, &c.
<i>Marsilea quadrifolia</i>	Catalonia and Portugal.
<i>Menyanthes trifoliata</i>	N. Hemisphere.
<i>Mimulus ringens</i>	N. America.
<i>Sagittaria leucopetala</i>	—
<i>Trapa natans</i>	Persia and Upper Nile.
,, <i>verbanensis</i>	Lago Maggiore.
<i>Polamogeton crispus</i>	Europe.
,, <i>polygonifolius</i>	Europe.
<i>Villarsia nymphæoides</i> = <i>Limnanthemum</i>	Britain.
<i>Myriophyllum scabratum</i>	N. America.

Of the half-hardy aquatics may be enumerated from North America the *Pontederias cordata* and *angustifolia*; from South America, *Jussieuia Sprengeri* and *J. octovalvis*, *Sagittaria guayanensis*, *S. montevidensis* and *Canna flaccida*; *Pontederia azurea* (*Eichhornia crassipes*), *Cyperus gracilis* and *C. hexastichus* are originally from Jamaica, and amongst others are *Jussieuia salicifolia* (India), *Limncharis emarginata* (Buenos Ayres); *Saccharum officinarum* (East Indies), and *S. officinarum atropurpureum* (West Indies); *Thalea dealbata* (South Carolina), and *T. divaricata*; *Cyperus alternifolius* (Australia), and *C. Papyrus*, of Egypt; and *Ceratopteris thalictroides*, common in the tropics.

There are about ten varieties of the beautiful Japanese *Nelumbium* including *Nelumbium speciosum roseum*, *N. kermesianum*, and *N. luteum*, whilst on the borders of the lake are fine specimens of *Eulalias*, *Musas*, *Caladiums*, *Hedychiums*, *Xanthisama atrovirens*, the gigantic leaved *Gunnera manicata* and *Boltonia asteroides*.

The *Victoria Regia* House contains a large circular central tank heated to from 86° to 90° Fah. and numerous smaller basins or cisterns around, for propagation, and for the smaller aquatics.

The *Victoria Regia* has in 1911 probably broken the record in Europe for the quantity of flowers produced in the one year, for although in their native home in the Amazons these most wonderful plants are perennials, in hothouses they are generally treated as annuals. The seeds were sown on February 26, the first leaf appeared on March 12, and the first blossom on June 18, and a regular succession has been produced until, on December 11, the total of 54 was reached from the one plant. The largest flower had a diameter of fifteen inches, whilst that of the largest leaf was seventy-three inches, with leaf-stalks eighty to one hundred and twenty inches long, the number of leaves being one hundred and thirty-two.

Victoria Cruziana has produced an abundance of fine blossoms of

ten inches diameter, and the leaves fifty-six inches across, with stalks forty to sixty inches. *Euryale ferox*, although flourishing in the winter in the Nymphæa house, was removed, for want of space, to the lily pond in the early part of the year, where it did exceedingly well, and produced fifty flowers and seventy leaves, with a diameter of forty-five inches.

In the *Victoria Regia* House are amongst others the following aquatics, including fine specimens of all the Nymphaeas before mentioned in the lily lake: *Acrostichum aureum* (West Indies), *Cabomba caroliniana* (U.S.A.), *Ceratopteris thalictroides* of the tropics; *Canna flaccida*; several fine species of *Cyperus* from Australia and Jamaica, including the Egyptian, *C. Papyrus*; the beautiful *Eichhornia* (*Pontederia*) *crassipes* of Guiana, whose vigorous growth became a serious impediment to the rivers in Florida, when introduced there some years ago, *Eichhornia azurea* and *E. cordata*; *Hydrocotyle Bonarenensis*, *Limnanthemum Henkei*; *Cryptocoryne Becketii* (East Indies), *Triglochin maritimum* of Britain; *Pilularia globulifera*; *Sagittaria graminea* (North America); the curious *Marsilea Drummondii*, resembling a four-leaved shamrock; fine specimens of *Saccharum officinarum* and *S. officinarum atropurpureum*; the two *Thalias*, *dealbata* and *divaricata*; *Limnocharis emarginata* from the tropical regions of America; *Myriophyllum affine* and *Ludwigia alternifolia* and *L. hirsuta*.

Among the climbers are *Aristolochias*, including *Aristolochia gigas*, *A. grandiflora*, *A. fimbriata*, and *A. elegans*; *Passiflora coerulea*, *P. coerulea grandiflora*, *P. coerulea racemosa*, *P. alba*, *P. adenopoda*, *P. 'Constance Elliott'*, *P. cardinalis*, *P. kermesina*, and the most beautiful of all *Passiflorae*, *Tacsonia Van Volxemii*; the curious *Hexacentris mysorensis*, and *Rivea hypocrateriformis*, whose large white moonlike flowers as they open suddenly at sunset are the great beauty of the tropics. *Vanilla aromatica* is a flourishing plant, as is *Schubertia grandiflora*.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

XIV.—ON SOME PLANT DISEASES NEW TO, OR LITTLE KNOWN IN, BRITAIN.

BY F. J. CHITTENDEN, F.I.L.S.

1. LETTUCE LEAF ROT.

AT the end of November last Mr. W. F. EMPTAGE forwarded to me a few small lettuce plants which had been sent to him from a garden near Haslemere, Surrey, where they had been grown planted out on the borders in a glasshouse after a crop of tomatos. Their leaves (especially, but not solely, the outer ones) had several small, round or elliptical, brown, dead spots upon them. The spots were pale in the middle, with a darker margin, and were from $\frac{1}{8}$ inch to $\frac{1}{4}$ inch in diameter. The tissues of these spots had in many cases dried up, leaving a more or less round hole. Several sunken areas of a similar character were also present along the midrib. Where the attack had resulted in many spots on the leaf the whole of it finally decayed. The growth of the plants had been seriously affected, and about a quarter of the crop had been attacked. The variety was 'Early French Frame Forcing.'

Microscopic examination of the affected areas showed the presence of a fungus belonging to the genus *Marssonina* associated with each of the spots, and agreeing in all its characters with a species first described in 1896 on lettuce by BERLESE,* and called by him *Marsonia Panattoniana*, in honour of Dr. GUIDO PANATTONI, of Lari di Pisa, who first sent diseased specimens to him.

The mode of attack described by BERLESE was precisely the same as in the plants sent to the Laboratory, and the severity of the attack in Italy at that time was such that Dr. PANATTONI had to report the destruction of 2300 plants.

There is no previous record of the occurrence of this disease in Britain. SORAUER† alludes to it as occurring in Italy alone. But the fungus was reported in 1906 by C. A. J. A. OUDEMANS‡ attacking lettuce and endive, and causing a leaf-rot of these plants in Holland; and in 1907 by APPEL and LAIBACH,|| causing a disease of cultivated lettuce for the first time in Germany. The last-named authors grew

* Dr. ANTONIO BERLESE, "Un nuovo marciume dell' Insalata (*Lactuca sativa*)" in *Rivista di Patologia Vegetale*, III. (1896), pp. 339-342.

† P. SORAUER, *Handbh. der Pflanzenkr.* II. (Ed. 3), p. 429.

‡ C. A. J. A. OUDEMANS, "Contr. à la flore mycologique des Pays-Bas XX." in *Overdr. Ned. Kr. Arch.* 3e Ser. II., 4 suppl.

|| O. APPEL and F. LAIBACH, "Ueber ein im Frühjahr 1907 in Salatpflanzungen verheerendes Auftreten von *Marssonia Panattoniana* Berl." in *Anstalt für Land- u. Forstwirts.* VI. (1908), pp. 28-37.

the fungus in pure culture, and carried out infection experiments reproducing the disease in the lettuce by its means.

The colourless mycelium of the fungus is somewhat restricted in its growth, being present almost solely in the tissues of the spots which it has killed. The spores occur clustered closely together in small but numerous groups on the dead spots, being at first covered by the epidermis, but later breaking through and exposed. They are produced at the apex of very short, erect hyphæ, and are about 11 to 20 μ long, and 3 to 4 μ broad, colourless and two-celled, much broader at the apex than the base. The septum is not always easy to see, but with proper illumination it becomes evident.

In 1896 a very similar disease attacked lettuce in a greenhouse in Troy, Ohio. In this case SELBY* describes the leaves as showing numerous perforations from 1 mm. to 2 mm. in diameter with irregular borders. The spots were at first pale in colour, but soon fell out. It was attributed to a new species of fungus by ELLIS and EVERHART, who called it *Marsonia perforans*. In this case the spots were 1 to 2 mm. in diameter, whereas in the case of the Italian disease they were described as having a diameter of 3 to 5 mm. In our specimens they were intermediate between these measurements, but the figure given in the American publication shows them somewhat larger than the dimensions quoted in the description. The spores are described as 11 – 15 \times 2.5–3 μ exceptionally reaching 20 μ long in *M. perforans*, and 15 – 20 \times 3–4 μ in *M. Panattoniana*. In our specimens they were 11–18 \times 3 μ . Except in the size of the spots and the spores no difference appears to exist between the fungi or in the effect they produce on the lettuce, and *M. perforans* is probably specifically identical with *M. Panattoniana*.

The disease does not appear to have spread to any serious extent in America, although it has been noticed in some other districts besides Troy. In the single case recorded in Ohio one-fifth of the crop was destroyed, and the German outbreak is referred to as somewhat serious. It seems, therefore, so far as our present evidence goes, that where the disease appears it may, if the conditions be suitable, assume an epidemic form, and that it is likely to be more prevalent in crops under glass than elsewhere, for probably there the most suitable conditions are found for its development. It would be well that growers of lettuce under glass, whether in frames, houses, or under cloches, should be on the watch for it.

The remarks made by the grower at Troy, Ohio, are instructive.† He regarded watering the lettuce as the quickest mode of spreading the disease. It first occurred along a strip on the greenhouse benches, and when about one-fifth of the crop had been attacked the grower used sulphur and oil on the steain pipes and watered carefully, keeping the house well ventilated. After these measures were adopted no

* A. D. SELBY, "Investigations of Plant Diseases in Forcing-house and Garden. I. Diseases of Lettuce." *U.S.A. Exp. Stn., Ohio, Bull.* 73 (1897).

† APPEL and LAIBACH, *l.c.*

‡ See SELBY, *l.c.*

further spread of the disease occurred. The grower appeared satisfied that the amount of moisture about on the plants and in the atmosphere was the predisposing cause of the trouble, for he determined henceforth to adopt a system of sub-irrigation in his houses.

There is little doubt that moist conditions and lack of ventilation would conduce to the spread of such a disease as this, and the main preventive measures would be attention to these details.

As the fungus is new to Britain, and is here recorded for the first time, a technical description is given.

MARSSONIA PANATTONIANA, Berlese in Riv. Patol. Veget. III.

(1895), p. 342.

= *Marsonia** *Panattoniana*, l.c.; *Succ. Syll.* xvi. p. 1021; &c.

= ? *M. perforans* Ell. and Everh., *U.S.A. Exp. Stn.*, Ohio, Bull. 73 (1897).

= *Marssonina Panattoniana* (Berl.) P. Magn., *Hedw.* xlv. (1906), p. 89.

Spots roundish, often confluent, pale with a darker margin, often dropping out, 3 to 5 mm. diameter; spore groups gregarious, at first subcutaneous, later liberated by the destruction of the epidermis; conidia obclavate, 11 to 20 \times 3 to 4 μ , one septate across the middle, hyaline, granular; basidia short.

2. LEAF-SPOT OF CAMPANULA.

In December 1911, some leaves of *Campanula persicifolia* were sent from his garden at Old Colwall by Mr. E. BALLARD. The leaves had greenish-brown, circular or sub-circular, dead or dying spots up to half an inch in diameter (but usually somewhat smaller), margined with purplish-brown scattered over them.

Microscopic examination showed the presence of a fungus, the mycelium of which permeated the tissues of the spots, and produced small tufts of fruiting branches which issued through the stomal openings. These tufts are whitish in appearance, and may be made out by careful search with a pocket lens. Each consists of several colourless, erect, rather crooked branches, and each branch bears at its apex a colourless two- or three-celled spore. The fungus is clearly a species of *Ramularia*, differing from most of its genus, however, at least so far as the present examples go, in the absence of denticulations at the apex of the conidiophores.

There is no record of the occurrence of a species of *Ramularia* attacking any *Campanula* in this country, but several other forms are known, including *R. variabilis* on foxgloves and mulleins, *R. geranii* on various species of *Geranium*, *R. hellebori* on *Helleborus foetidus* and *H. viridis*, and *R. vallisumbrosae* on *Narcissus poeticus*, as well as many others of less importance in horticulture.

* The generic name was spelt by BERLESE and others '*Marsonia*,' but FISCHER, who established the genus [Rabenhorst, *Fungi Europ. Exsicc.*, No. 1857 (1874)] wrote the name *Marssonina*, naming the genus after Marsson.

Ramularia vallisumbrosae, Cavara, is the correct name of the fungus to which I drew attention in the *Gardeners' Chronicle*, n.s. xxxix. (1906), p. 277, as causing a troublesome disease of *Narcissus poeticus*. I there gave the name *Ramularia narcissi* to the fungus under the impression that it was new to science. Subsequently I found that CAVARA had already described the same fungus causing a disease of the same plant at Vallisumbrosa, in Northern Italy. His name for the fungus therefore has the priority, and the name *R. narcissi* must be dropped.

The present species agrees well with the form described and figured by FRESSENIUS* in 1863 under the name *Ramularia macrospora*. His fungus occurred in Germany (Frankfurt ?) on *Campanula pyramidalis*, FUECKEL† records it on *C. glomerata* also in Germany, KRIEGER‡ on *C. persicifolia*,§ and on *C. ranunculoides*.§ A variety to which the name *R. macrospora* var. *Campanulae-Trachelii*, Sacc., was given occurred in North Italy on *C. Trachelium*,|| and ALLESCHER¶ recorded the same fungus in Bavaria. The last-named botanist also described a variety,** which he subsequently†† raised to specific rank under the name *Ramularia Campanulae-latifoliae*, causing spots on leaves of *C. latifolia*. Whether the fungus growing on one species of *Campanula* can infect another species, or whether the different forms are physiologically distinct, is not known. The forms given varietal names, and the similar ones growing on *Aster Novae-Angliae* in Wisconsin, and on *Senecio vulgaris* included by SACCARDO‡‡ as varieties under *Ramularia macrospora*, are very similar in appearance, though differing slightly in morphological characters. Their physiological identity and their mutual powers of infection can be determined only by inoculation experiments, which have not yet been carried out.§§

The fungus on *Campanula persicifolia*, however, agrees in every way with FRESSENIUS' description, and does not require a varietal name.

The circumstances under which this attack occurred are instructive. Mr. BALLARD writes:—"One would think the plants badly affected were, from their appearance, extremely robust. . . . Owing to the acute drought the plants were at a standstill all the summer, then in autumn they made very rapid growth indeed, and were growing vigorously when frost and rains began."

Thus, as in so many other cases, the largest and apparently most robust plants, growing vigorously at a season when damp conditions came, were the ones to fall victims, while their less sappy companions

* FRESSENIUS. *Beiträge* iii. (1863), p. 88. Taf. xi., fig. 29-30.

† FUECKEL. *Fungi Rhenani*, No. 2107.

‡ KRIEGER. *Vergl. Fungi Saxonici*, No. 1540.

§ *Ibid.* No. 638.

|| P. SACCARDO. *Flor. ital.* t. 1003.

¶ ALLESCHER. "Mykologische Mittheilungen aus Süd-Bayern." *Hedwigia* (1895), p. 283.

** ALLESCHER. *Verzeich. in Süd Bayern, Pilze* iii. p. 101.

†† ALLESCHER. *Hedwigia* (1895), p. 283.

‡‡ SACCARDO. *Sylloge Fungorum*, iv. p. 211, and *Flora ital.* t. 1003.

§§ P. MAGNUS describes yet another *Ramularia* (*R. Phyllostictae-michauxioides*) on *Campanula michauxioides*.

were free from attack. A method of prevention of this disease is thus at once suggested.

Probably prompt spraying with potassium sulphide (1 oz. to three gallons of water), together with the destruction of the diseased leaves, will be efficient in checking the spread of the disease when once it appears, as it has with the disease on *Narcissus* previously referred to.

As this is the first record of the occurrence of the disease in Great Britain, a technical description of the fungus is given.

RAMULARIA MACROSPORA. Fresenius in *Beiträge*, iii. (1863)
p. 88, figs.

Spots greenish-grey, bordered with purple-brown; fertile hyphæ in fascicles issuing through stomata, straight or somewhat curved, with one or two septa, rather narrower than conidia; conidia cylindrical, obtuse at apex, straight, usually two septate, 25-36 μ long, 2.5-3.5 μ wide, very slightly constricted at the septa.

On leaves of *Campanula persicifolia* from Old Colwall, Malvern.

3. STREAK DISEASE OF SWEET PEAS.

DURING the past four or five years large numbers of sweet peas have succumbed to a rather mysterious disease called, from one of its most constant and prominent symptoms, "streak." The disease is characterized by brown streaks along parts of the stem, a yellowish tinge in the foliage, which fails to develop properly, showing a wrinkled appearance; the flower buds become yellow and drop off without opening, or in less advanced cases open and show brownish or yellowish marks on the petals, and a general lack of substance. Partial recovery may occur, but usually the symptoms spread, brown spots appear in the leaves, and finally the plant collapses and dies. One or more of these symptoms may be lacking, but a constant one, though often overlooked, is afforded by the root. In advanced cases many of the root fibres, and possibly the whole root, may be dead and brown. If examination be made earlier, it will be found that brown dead areas occur in the cortical tissues of parts of the roots, sometimes just at the collar, but very frequently in other parts. This symptom has been present in every well-marked case of "streak" disease examined to the number of several hundreds. The disease may attack plants in all stages of growth, but it is perhaps generally most noticeable just when they are coming into flower.

The disease presents some peculiar features, and even yet there are some points that require elucidation. As usual in cases of plant disease, the specimens first sent for examination were far from complete, consisting of pieces of stem, or even single leaves showing brown spots. Careful examination of these, as a rule, failed to show any trace of fungus, even as mycelium in the tissues, still less of fruiting bodies

on the surface. Occasionally on rather long-dead specimens a saprophytic fungus, such as *Botrytis cinerea*, was present. This absence of any obvious cause for the disease led to a good deal of speculation. Some writers have put it down to "physiological causes" (meaning a disease due to errors in cultivation), and as will be seen with, at least in part, good reason. Others ascribed it to bacterial attack, probably on account of some of its symptoms being similar to those seen in certain forms of bacterial disease in other plants.

Later more complete specimens were sent to the Laboratory, and as the appearance of the plants previously sent in had suggested the possibility of serious interference with the water supply at a critical period of the plant's growth, careful examination was made of the roots. In every case where the specimens were complete, and had been properly packed, the fungus *Thielavia basicola* was found present on the brown patches already referred to on the roots.

Unlike the two fungi discussed above, this is well known in Britain, and is widely spread over the world. BERKELEY and BROOME* were the first to describe it in 1850. They found one form of it at the base of stems of peas, and of *Nemophila articulata*, at King's Cliffe, and named it *Torula basicola*. This form has been met with from time to time on a variety of plants, and is the most prevalent one on sweet pea roots. The spores are very dark chestnut-brown in colour, and are produced in rows of five to seven, sometimes in single rows, sometimes in a few such rows springing close together from the mycelium which, at least at first, grows chiefly in the cortical tissues of the root. These spores are very blunt, and of such a shape that when still in the chains in which they are produced, no constriction marks the place where one spore joins its fellow. A second form of spore, oblong and colourless, is formed inside the ends of some of the hyphæ, but we have rarely met with this form on sweet peas; and lastly a third form belonging to a higher type of fruit is to be met with on dying or dead roots. We have found this stage quite frequently on such roots. They are dark brown, different in shape from the dark brown conidia, and produced in eight-spored asci in very fugitive perithecia, which break to allow the escape of the spores. ZOPF described the last and highest form in 1876, and founded the genus *Thielavia*† to contain it, recognizing that it was the final stage in the life history of the fungus BERKELEY and BROOME had described under the name *Torula basicola*, and therefore calling it *Thielavia basicola*.

The conidial or *Torula* form of the fungus had been found by SOROKIN‡ in 1876 in Russia, but he failed to recognize its identity with *Torula basicola*, and coined another name for it, calling it *Helminthosporium fragile*. SACCARDO also failed to identify it correctly when

* M. J. BERKELEY and C. E. BROOME. "Notices of British Fungi," *Ann. and Mag. Nat. Hist.* II., June 5, 1850, p. 461.

† W. ZOPF, in *Sitzungsber. d. Botan. Ver. d. Prov. Brandenburg*, June 1876, p. 105.

‡ N. SOROKIN. *Hedwigia* (1876), p. 113.

later* he transferred SOROKIN's fungus to the genus *Clasterosporium*, calling it *C. fragile*, although he remarks "An *Torulae* affinis? Certe longius distat ab *Helminthosporis*."

The name of the fungus involved is therefore *Thielavia basicola* Zopf. *Torula basicola* Berk. and Br., *Helminthosporium fragile* Sorok., and *Clasterosporium fragile* (Sorok.) Sacc. are synonyms.

BERKELEY was in some doubt as to whether the fungus was a saprophyte or a parasite, for he says†: "It is either destructive of the plant on which it grows, or is developed on it in consequence of previous disease," and the doubt he felt is certainly emphasized by the fact that the fungus has been found on a large number of plants belonging to many different and quite distantly related families.

Thus ZOPF found his examples on the roots of *Senecio elegans*, in Berlin, and subsequently wrote a paper describing its attack upon Lupines‡ (*Lupinus angustifolius*, *L. albus*, and *L. thernis*); he also found it on *Trigonella coerulea*, *Onobrychis Cristagalli*, *Pisum sativum*, &c. SOROKIN's specimens came from dead roots of horseradish (*Cochlearia Armoracia*) in Russia. SELBY found it on *Begonia rubra* in greenhouses in Ohio; J. J. M. VAN HOOK on Gingseng (*Aralia quinquefolia*); THAXTER (the first to find it in America in 1891) on violets; many observers in America and Italy on tobacco; BESSEY on culinary peas in South Carolina (and we have seen many examples of it on the same plant in this country, especially perhaps in 1911, when it was very prevalent), on sugar beets in Utah, and on "various plants" in Florida; E. F. SMITH on cowpea (*Vigna*) and cotton seedlings; SORAUER on *Cyclamen* (on which plant we have also seen it); and so on.

The fact that *Thielavia basicola* has been found upon such a wide range of plants suggests that possibly this fungus is not a true parasite, for most parasitic fungi are restricted to one plant, or at most to a few plants nearly related; on the other hand, there are some common fungi which appear to be capable of attacking a large number of hosts often widely distinct from one another, and even of growing as saprophytes on dead vegetation. *Botrytis cinerea* belongs to this group, and so does *Cladosporium herbarum*. As we have previously shown,§ there are strong reasons for suspecting that the last-named fungus is capable of attacking leaves of apples only after they have been weakened from some cause, and it is parasitic upon other plants growing under somewhat unhealthy conditions. There has evidently been in the minds of many investigators of diseases where the fungus now under consideration has apparently been involved that, in order to permit its attack, the host plant must have been weakened from some cause.

We have already remarked upon the doubt expressed by BERKELEY.

* P. SACCARDO. *Sylloge Fungorum*, iv. (1886), p. 386.

† BERKELEY and BROOME, *l.c.*, p. 462.

‡ W. ZOFF. "Ueber die Wurzelbräune d. Lupinen," in *Zeitschr. f. Pflanzenkr.* i. p. 72.

§ F. J. CHITTENDEN. "Contributions from the Wisley Laboratory. I. Apple-leaf spot." (*JOURNAL R.H.S.*, vol. xxxiii. (1908), p. 500.

LYMAN J. BRIGGS* considered that tobacco roots were attacked by *Thielavia* much more severely when the soil was alkaline through the too liberal use of lime, ashes, or manures containing carbonate of potash. He therefore recommended sulphate instead of carbonate of potash, the avoidance of lime on diseased fields, and the use of superphosphate or dissolved bone.† SORAUER,‡ in his study of the attack on Cyclamen, concluded that the disease appeared mostly when the plant had been excessively manured, over-watered, and so on. PEGLION§ expressed a very similar opinion with regard to the attack on tobacco. GALLOWAY|| considered that proper care in selecting soil, avoiding too great an excess of humus, and in transplanting would prevent the attack on violets. ADERHOLD¶ carried out numerous inoculation experiments from pure cultures with plants liable to attack and found great difficulty in reproducing the disease in them, although the material had been obtained from sources where the disease was rife.

On the other hand other authors have regarded the fungus as an active parasite, and have described experiments where infection has been freely obtained.

Our own experiments corroborate ADERHOLD's. In 1908 pots of ordinary soil, without artificial manures, were sown with sweet peas in the greenhouse, half of them being inoculated with active material of *Thielavia*, the remainder being not inoculated. The plants grew and flowered well, alike those inoculated and those not. No disease occurred.

In 1909 a series was prepared as follows:—

Soil + Superphosphate and Potassium Sulphate. Tending to be Acid		Soil + Powdered Chalk and Potassium Carbonate. Tending to be Alkaline	
Half the Pots inoculated with <i>Thielavia</i>	Half not inoculated	Half the Pots inoculated with <i>Thielavia</i>	Half not inoculated
No disease	No disease	No disease	No disease

Thus, again, attempts to reproduce the disease failed, and in this experiment at least the increased alkalinity of the soil failed to encourage the attack—all the plants grew and flowered well.

In 1910 a series of pots was prepared as in 1908, half being inoculated, half not, with the fungus. After the plants had grown about

* L. J. BRIGGS. "The Field Treatment of Tobacco Root-rot," *U.S.A. Dep. Agr., Bur. Pl. Ind., Circ. 7* (1908).

† *I.c.*, p. 8.

‡ P. SORAUER. "Ueber die Wurzelbräune der Cyclamen," *Zeitschr. für Pflanzenkr.*, v. (1895), pp. 18-20.

§ V. PEGLION. "Marciume radicale della piantane di tabacco causato dalla *Thielavia basicola* Zopf," *Atti R. Accad. Lincei*, ser. 5, vi. (1897), pp. 52-56.

|| B. T. GALLOWAY. *Commercial Violet Culture*, pp. 170-174.

¶ R. ADERHOLD. "Impfversuche mit *Thielavia basicola* Zopf," *Arbeit. Kgl. Gesund., Biol. Abt.*, iv. (1905), pp. 463-465.

a foot high, some of each group of pots were over-watered and kept over-watered for a few days. The effect of this was very marked. Those in the uninoculated soil were slightly checked in growth, but with proper treatment subsequently as regards watering, they recovered. Seventy-five per cent. of those in the inoculated soil, on the contrary, gradually sickened and died, although treated in precisely the same way as the others, and the fungus, *Thielavia basicola*, was found on the roots, and in some cases, also on the part of the stem just above the soil surface, of all, but not on those which recovered, nor on those in the uninoculated soil. It would therefore appear that the weakening of the roots by the over-watering laid the plants open to the attack of the fungus, which but for that would have been harmless.

Thielavia basicola is capable of growing on dead vegetable matter, and can therefore no doubt maintain itself for a considerable time in a soil which contains organic matter of this nature. It is also, as we have pointed out, capable of growing on a variety of different plants. It is therefore improbable that rotation of crops would be by any means a certain mode of avoiding the presence of the fungus. Indeed we have frequently heard of sweet peas suffering severely from attacks when planted in newly-turned up pasture land, or in land that had long carried other crops.

The partial sterilization of the soil by steam has proved most successful in America in dealing with the disease on tobacco, but that is practically impossible to effect on a large scale outdoors; and it is questionable whether soil-sterilization would be altogether advisable with peas, for it would prevent the formation of nodules upon their roots. Probably a thorough soaking of the soil with a solution of one part of formalin in two hundred of water would also affect sterilization to a sufficient extent, and if it were attempted the solution should be applied at least three weeks before the sweet peas are put out or the seed is sown.

The National Sweet Pea Society collected information regarding the outbreaks of the disease from many of their members in 1910,* but nothing in those reports showed that any one variety or type of sweet pea was more susceptible than another, nor that the disease was more prevalent on one type of soil than on another, or with one system of manuring than another. In fact, the answers given failed to show that any single predisposing condition obtained through all the attacks. From our own experiments, however, and from a consideration of attacks examined in various gardens, we have to conclude that any cause tending to the weakening of the root of the sweet pea will lay it open to the attack of the fungus.

At first the almost constant presence of free-living eelworms about the roots of affected plants suggested that they were a cause of the necessary weakening, and it is quite possible that they may be, though the evidence available is not very conclusive. A frequent cause is

* See *Sweet Pea Annual*, 1911.

undoubtedly the presence of too much water in the soil for a time, even if only for a short time, which reduces the vitality of the plant almost at once. Overwatering must be avoided at all costs; indeed it would probably be better not to water at all—provided the ground had been thoroughly dug and a loose soil mulch was kept on the surface in dry weather—than to overwater. Drainage must be thoroughly efficient. Another cause of loss of vitality through root-weakening is the too prevalent practice of placing thick layers of manure between the spits in double-digging. Every care should be taken to incorporate the manure used thoroughly with the soil, and to avoid separate layers of soil and manure alternating with one another. Over-manuring may result in yet another mode of check.

Probably no one cause contributing to the weakening of the root, and thus laying it open to attack by the fungus, will be found that will fit all cases of disease, but there seems no doubt that if care be taken to avoid every possible check to root development and activity, the “streak disease” will cease to be so troublesome.

REPORT OF CONSULTING CHEMIST FOR THE
YEAR 1911.

By Dr. J. A. VOELCKER, M.A., F.I.C., F.L.S.

DURING the year 1911, seventeen samples were submitted to me, in my capacity as Consulting Chemist to the Society, for analysis.

This is an increase of three on the number sent in 1910. The list of samples is as follows:—

Soils	4
Waters	8
Manures	4
Miscellaneous	1
	—
	17

1. SOILS.

Of the four samples sent to me, observations on the following three cases may be of interest:—

(a) This was a sample of turf and soil from the neighbourhood of Waltham Cross. It came from a pasture which had been much neglected, and it was desired to improve this for the grazing of cows. The herbage bore all the appearances of having come, as stated, from a “neglected pasture,” for it was composed to a large extent of tufts of long grass which could be readily pulled off by the hand.

The analysis of the soil gave the following results:—

	Soil dried at 212° F. Per cent.
Organic matter and loss on heating	7.32
Oxide of iron	2.87
Alumina	3.94
Lime	50
Magnesia	40
Potash	28
Soda	27
Phosphoric acid	17
Sulphuric acid	07
Insoluble silicates and sand	84.18
	—
	100.00
	—
Nitrogen	317

The above figures show the soil to be, so far as its constituents are concerned, by no means of an unsatisfactory nature, and no particular deficiency was brought to light. Thus, there would appear to be plenty of vegetable matter and of nitrogen, while potash and phosphoric acid, though present in but moderate amount, could hardly be called distinctly deficient. Similarly is this the case with regard to lime. What is really needed in such a case is good treatment, and, in the first place, a great improvement would be effected, where so much loose grass occurs, by chain-harrowing the land, following this by rolling. Subsequently, the application of lime would, I am inclined to think, be beneficial, not merely because the amount of lime in the soil is not large, but also because of that of magnesia being somewhat high. On such a soil, too (which was a fairly heavy loam), basic slag might very well be tried, and, along with it, it might be advantageous to use sulphate of potash.

(b) This sample was a soil from a kitchen garden at Chobham, Surrey. The garden had been made out of a grass field, and it was desired to grow apples, pears, fruit generally, and vegetables. It was complained about it that spinach, onions, and beetroot had all failed. The analytical results were as follows:—

Soil dried at 212° F	
	Per cent.
Organic matter and loss on heating	5.61
Oxide of iron	1.27
Alumina . . . . .	.80
Lime . . . . .	.17
Magnesia . . . . .	.20
Soda . . . . .	.11
Potash . . . . .	.10
Phosphoric acid . . . . .	.11
Sulphuric acid . . . . .	.03
Insoluble siliceous matter	91.60
	<hr/>
	100.00
	<hr/>
Nitrogen . . . . .	.196

This was a black peaty sand of very light character. The analysis showed it to be extremely deficient in lime, and also poor in both potash and phosphoric acid. Speaking generally, it may be said that such a light soil would never do really well for fruit trees, but that what it would really need would be more "substance" to be put into it, such as could be effected by the use of clay or by mixing with other soil of heavier character. For bush fruit the soil might probably answer better. In any case the need of lime is very apparent.

(c) This was a soil from the Greensand formation in the neighbourhood of Devizes, and the question put was whether it would be suitable more particularly for apple-growing.

The analytical results were:—

	Soil dried at 212° F. Per cent.
Organic matter and loss on heating	3.91
Oxide of iron	3.64
Alumin	2.25
Lime . . . . .	.76
Magnesia . . . . .	.43
Potash . . . . .	.61
Soda . . . . .	.09
Phosphoric acid . . . . .	.20
Sulphuric acid . . . . .	.04
Insoluble siliceous matter	88.07
	<hr/> 100.00
Nitrogen . . . . .	.076

This was a soil deficient in vegetable matter and extremely poor in nitrogen. Its light character would probably make it an unsuitable one for apple-growing, and, as in the previous case, the real requirement of the soil is to impart to it more "substance." In the manurial direction, the principal requirement is the supply of more vegetable matter and nitrogen.

2. WATERS.

Of the eight samples submitted to me, five were perfectly good and wholesome supplies. In the sixth case, the water, though not really bad, was not altogether satisfactory; the remaining two cases are noticed below:—

(a) This was a water from Maidenhead. The analytical results were:—

	Grains per gallon.
Total solid residue	20.44
Oxidizable organic matter . . . . .	.08
Nitric acid	4.34
Chlorine	2.58
Equal to chloride of sodium	4.26
Free ammonia	None.
Albuminoid ammonia . . . . .	.001

This water contained but little dissolved organic matter or ammonia, but the proportions of nitrates and chlorides were distinctly high, and indicate the presence of drainage matter. In addition, a distinct amount of lead was found to have been dissolved in the water.

As a result of subsequent inquiry, it was found that there had been a case of illness, and that cesspools existed not far from the well.

(b) This was a water which came from a well in Surrey. The analysis was as follows:—

	Grains per gallon.
Total solid residue	61.04
Oxidizable organic matter	3.99
Nitric acid	16.31
Chlorine	6.89
Equal to chloride of sodium	11.35
Free ammonia . . . . .	.044
Albuminoid ammonia . . . . .	.032

The water had a deep yellow colour and was of a distinctly hard nature. The results show that it contained exceedingly large quantities of dissolved organic matter and ammonia, while, in addition, chlorides and nitrates were exceptionally high.

This was a water of surface supply, and had evidently been grossly polluted. In addition, it contained some amount of zinc in solution, the water having, no doubt, acted upon galvanized iron pipes.

In this connexion it is worth while to note that it frequently happens that waters which contain any marked quantity of chlorides are found to act upon metal pipes like the above, and that it is not necessary that they should be soft waters for this action to take place, though such action more generally takes place, it is true, with soft waters than with hard ones.

3. MANURES.

(a) *Bone Meal.*

A sample of bone meal was sent to me, not for the purpose of determining its quality, but because a number of sparrows had been found dead in a field where the bone meal had been spread, and it was thought likely that poison had been mixed with the bone meal. This, however, was not found to be the case.

(b) *Fish Manure.*

The analysis of this—a sample of quite good quality—was as follows:—

	Per cent.
Moisture	10.72
* Organic matter	51.13
† Phosphoric acid	8.60
Lime	10.87
Magnesia, alkalies, etc.	13.74
Sand	4.94
	<hr/> 100.00
* Containing nitrogen	5.76
Equal to ammonia	6.99
† Equal to tribasic phosphate of lime	18.79

(c) *Rape Dust.*

A member of the Society, residing in Kent, sent me a sample of this, being somewhat suspicious of it, as it appeared to him to contain a considerable amount of dirt. This was confirmed by my analysis, which gave the following results:—

	Per cent.
Nitrogen	3.83
Equal to ammonia	4.65
Mineral matter	28.80
Including sand	19.13

Care must be exercised in the purchase of rape dust or rape cake to

be used for manure, as these materials are frequently found to be much mixed with earth and sandy matter.

(d) *Lime.*

A sample of this, sent from Hertfordshire, gave results as follows:—

	Per cent.
Lime	87·6
Oxide of iron and alumin	·79
Silica	4·56

This was quite a good sample of lime, and it slaked very well indeed.

4. MISCELLANEOUS.

Pond Mud.

This was mud from a lake in Gloucestershire which had been cleaned out, and it was proposed to make a mound of the mud and plant rhododendrons on it, if suitable. The mud, as received, was found to contain 56·75 per cent. of water. The analytical results on the mud in the dried state were:—

	Mud dried at 212° F. Per cent.
* Organic matter	11·22
Oxide of iron and alumina	11·29
Carbonate of lime	25·57
Sulphate of lime	·91
Phosphoric acid	·28
Alkalies, etc.	1·11
Siliceous matters	49·62
	<hr/> 100·00
* Containing nitrogen	·394
Equal to ammonia	·478

From a manurial point of view, the above figures are very satisfactory, and the mud would have distinct value, the proportions of nitrogen and phosphoric acid being quite good. The amount of lime, however, would appear to be decidedly in excess of what is desirable for the purpose of growing rhododendrons, azaleas and the like, although as a general top-dressing for grass land, the material should answer very well.

MISCELLANEOUS FLOWERING PLANTS AT WISLEY, 1911.

ANTIRRHINUM (all sent by Messrs. Watkins and Simpson).

grandiflorum 'Dainty Queen.'—A dwarf variety with bright yellow flowers. It is not so vigorous in growth as some of those following.

grandiflorum 'Golden Fairy.'—A dwarf variety with pale pink flowers which have a deep yellow lip. Habit rather weak.

grandiflorum 'Maize Queen.'—A useful variety of medium height producing an abundance of large deep lemon yellow flowers.

grandiflorum 'Pink Queen.'—Another useful variety similar in habit to 'Maize Queen,' but having delicate rose pink flowers with a golden yellow lip.

grandiflorum 'Rose Queen.'—Flowers deep rose; habit dwarf and free flowering; certainly one of the best for bedding purposes.

nanum 'Buff Queen.'—Height about 1 foot, flowers yellowish buff with a deep lemon yellow lip.

nanum 'Cottage Maid.'—A pretty variety having delicate rose pink flowers with a white lip. Height about 14 inches.

nanum 'Golden Queen.'—A deep golden yellow variety growing about 2 feet in height.

nanum 'Light Fire.'—A most useful variety with reddish terra-cotta flowers of exceptional size borne in great profusion. The habit of the plants is very bushy and they are about 1 foot tall.

nanum 'Orange Prince.'—A very effective dwarf and free flowering variety with deep coppery orange flowers.

nanum 'Rose Doré.'—A variety of dwarf habit with very pretty deep rose flowers of large size.

nanum roseum superbum.—Flowers bright rose; habit dwarf.

nanum 'Scarlet King.'—Of medium height and with very striking flowers of a very deep scarlet colour.

nanum 'Vesuvius.'—A very pretty reddish terra-cotta variety somewhat similar to 'Light Fire,' but much darker.

nanum 'White Queen.'—A very useful pure white variety of dwarf compact habit.

ASTER (*Callistephus*).

'Admiration' (Veitch).—An excellent Aster growing about 18 inches high and carrying large numbers of medium sized flowers of a rosy salmon colour. The plants are bushy and branching in habit and very effective for bedding.

'Crego's Giant Comet Shell Pink' (Dreer).—Flowers large and of a pale pink colour; plants rather tall and much branched.

'Dreer's Peerless Pink Branching' (Dreer).—Flowers of good

shape and size, rosy-lilac in colour shading to white in the centre. Habit tall and branching.

'Dreer's Pink Beauty' (Dreer).—This variety, which grows about 18 inches, has large delicate pink tall flowers of excellent form.

'Lavender Gem' (Dreer).—Flowers small, light blue, height about 1 foot, habit rather weak.

'Mammoth Azure Blue' (Veitch).—A very delicate blue Aster 3 inches across, borne on good branching plants.

'New Tall Branching' (Whitelegg).—A variety of tall and branching habit with good delicate pink flowers 3 inches across.

'Ostrich Feather Brilliant Carmine' (Veitch).—A good deep rose pink variety with large flowers. The plants are much branched and very free flowering.

'Ostrich Feather Light Blue' (Veitch).—A pale blue Aster becoming almost white in strong sunlight. The flowers are 3 inches across and the plants which grow about 18 inches high are much branched.

'Ostrich Feather Terra Cotta' (Veitch).—A very vigorous variety, much branched, growing about 2 feet tall; colour, dark old rose with a yellow centre.

'Peerless Pink Branching' (Sydenham).—A tall branching Aster with rosy-lilac flowers of good shape and size.

'Ray Dark Blue' (Veitch).—A vigorous Aster about 18 inches tall with deep violet blue flowers having all the florets quilled. A most effective plant for bedding.

'Ray Fairy' (Veitch).—Height of plants about 14 inches; flowers small, florets quilled.

'Ray Red' (Veitch).—This is a dull rosy crimson Aster with quilled florets. It grows about 18 inches tall, is free flowering in habit and the individual flowers are about 3 inches across.

'Ray Rose' (Veitch).—Flowers of good size, deep rose in colour, most of the florets quilled, stock not quite fixed.

'Ray White' (Veitch).—A large white Aster with mostly quilled petals. Height about 18 inches.

'Late Branching Azure Blue' (Dreer).—A good Aster of branching habit with large lavender blue flowers. Height about 18 inches.

'Late Branching Crimson' (Dreer).—A useful variety about 18 inches to 2 feet high with medium sized bright crimson flowers. Habit much branched.

'Late Branching Deep Purple' (Dreer).—A splendid deep purple Aster about 3½ inches across. The plants are tall and much branched.

'Late Branching Deep Rose' (Dreer).—An exceptionally fine Aster of branched habit growing about 2 feet high and carrying very numerous bright crimson-rose flowers of large size.

'Late Branching Lavender' (Dreer).—The flowers of this variety are pale lavender blue in colour and have quilled florets. The plants are 2 feet high and branched.

'Late Branching Pure White' (Dreer).—A large pure white Aster borne on branching plants growing about 2 feet tall.

'Late Branching Rose Pink' (Dreer).—A tall branching variety with large rosy-lilac flowers with a tinge of white in the centre.

'Late Branching Shell Pink' (Dreer).—A pale pink variety of large size. Plants of branching habit and about 2 feet high.

'Violet King' (Dreer).—An excellent variety having deep violet flowers of large size. The plants are very tall and branched.

'White Fleece' (Dreer).—A free flowering small white Aster of medium height and branching habit.

BEGONIA.

'Allnutt's strain' (Allnutt).—An exceptionally fine strain of tuberous rooted Begonias with large flowers often measuring 7 inches across. The colours vary from pure white to deep scarlet and include good yellows and many delicate shades of salmon and rose-pink. The foliage is large and healthy and often handsomely marked. The plants are very free-flowering and many of them have double flowers.

'Scented Double' (White).—A delicate salmon pink, double, tuberous rooted Begonia with large handsome flowers having a delicious scent which is more pronounced in the early morning. The plant is free-flowering and robust in habit.

BRACHYCOME.

iberidifolia 'Purple King' (Veitch).—A charming dwarf plant about 8 inches high bearing small deep violet blue flowers with a dark centre. The flowers are $\frac{3}{4}$ inch across and resemble those of the *Cineraria* in shape. The leaves are pinnate with linear segments.

CALCEOLARIA.

'Buttercup' (Veitch).—A very graceful free-flowering hybrid Calceolaria having Aureoline or Buttercup-yellow flowers spotted with brownish red. It is said to be a cross between *C.* 'Golden Glory' and *C. Clibranii* and grows from $1\frac{1}{2}$ to 2 feet tall.

CANDYTUFT.

'Deal's Snowflake No. 1.' (Deal).—A pure white very free-flowering variety. The size of the heads of bloom varied somewhat.

'Deal's Snowflake No. 2.' (Deal).—This variety was very similar to the preceding except that the heads of bloom were more uniform in size.

'Empress White' (Bell and Bieberstedt).—An exceptionally large and useful pure white variety of very free-flowering habit.

'Giant Hyacinth flowered' (Veitch).—Another excellent white variety of very free-flowering habit.

CLARKIA.

elegans fl. pl. 'Brilliant' (Veitch).—A most useful annual having double rosy-pink flowers borne in the axils of the leaves on spikes 2 to

2½ feet high. It is very free-flowering, excellent for cutting and remains in bloom for a long period.

DIANTHUS.

chinensis Heddewigii 'Double Crimson' (Veitch).—Flowers double, 2 inches across, deep rich crimson in colour.

laciniatus fl. pl. 'Snowdrift' (Veitch).—Flowers white, double, over 2 inches across; petals much fringed. A band of pale lilac surrounds the centre and the flowers are slightly fragrant.

laciniatus 'Scarlet Queen' (Veitch).—A very showy and free-flowering variety with rich scarlet single flowers measuring 1½ inches across.

HOLLYHOCK.

'Newport Pink' (Dreer).—Growing on.

HONEYSUCKLE.

'Late Dutch' (Hudson).—A most useful climber flowering throughout the late summer and well into autumn. The fragrant flowers are rosy-crimson on the outside, while the inside is creamy-buff. The leaves are lanceolate and opposite.

MARIGOLD.

Single French 'Silver King' (Veitch).—A compact dwarf variety with single flowers which are bright golden yellow and crimson in colour. This should prove most useful for bedding.

MATRICARIA.

crimia 'Golden Ball' (Veitch).—A dwarf bedding plant about 9 inches tall having large numbers of lemon yellow flowers in which the florets are tightly packed together after the manner of a garden daisy. The blooms measure about ½ inch in diameter.

MIGNONETTE.

'Machet' (Sydenham).—A variety obtained from California. It is vigorous and much branched and bears an abundance of delightfully scented flowers. Height 1 foot.

NASTURTIUM.

'Dwarf Scarlet Geranium leaved' (Dreer).—The bright orange scarlet flowers are rather hidden by the very vigorous dark green foliage.

'Liliput Ruby' (Veitch).—An excellent compact grower with very numerous flowers of a pretty rose shade.

'Queen of Tom Thumb Primrose' (Veitch).—A dwarf variety with mostly bright yellow flowers and variegated foliage. The stock requires a little more selection as flowers of orange, scarlet, and deep crimson shades were produced.

'Queen of Tom Thumb Rosy Scarlet' (Veitch).—A dwarf orange scarlet variety of medium size; foliage variegated.

'Queen of Tom Thumb Scarlet' (Veitch).—Very similar to the preceding variety, but more vigorous in habit.

'Tom Thumb Feltham Beauty' (Veitch).—A dwarf rich orange variety. The foliage is small and light green in colour.

'Tom Thumb Fireball' (Veitch).—A dwarf deep orange scarlet variety with small dark green leaves. It is very effective and free-flowering.

PRIMULA.

'Lissadell Hybrid' (Cooper).—This hardy Primula is a cross between *P. pulverulenta* and *P. Cockburniana*. It flowers in May and has bright vermilion red flowers which are borne in whorls on a spike about 1 foot tall after the manner of *P. pulverulenta*. The individual flowers are 1 inch across and the calyx and flower stem are mealy. The colour deepens towards the centre of the flower. The plant is free in flowering and often bears three or four spikes. The leaves are very similar to those of *P. pulverulenta*. All the flowers on the plants of this variety at Wisley were pin-eyed. The parentage is the same as that of *P.* × 'Unique' which has received an Award of Merit.

ZINNIA.

elegans 'Fire King' (Veitch).—A splendid brilliant scarlet bedding plant with double flowers of medium size.

AUTUMN-FRUITING RASPBERRIES AT WISLEY, 1911.

THE following varieties of Raspberries were planted at Wisley with a view to ascertaining which could be depended upon to supply good fruit during the autumn months. The trial has conclusively shown that, with careful attention to detail, beautiful fruit may be obtained in great quantity and at a season when it is greatly appreciated. The canes should be cut down to within about 6 inches of the ground in March, and mulched with some well-decayed manure. When growth is advanced it will be well to go through the plantation and carefully thin the growths, retaining only the strongest, at the same time removing all suckers. The canes when laden with fruit have an arched and graceful habit, which causes the leaves to grow at right angles at the top of the canes, thus protecting the fruit from the rain and early frosts. On this account staking and tying should not be practised. Several of the summer-fruited varieties were planted in this trial but did not fruit when cut down with the others.

*1. *Améliorée Congy* (Burn).—Canes very strong, rich purple in colour, having mostly three leaflets on each stalk, and with very few spines; fruits large and light in colour; poor cropper.

2. *Baumforth's Seedling* (Rivers).—Canes fairly strong, dark purple in colour, with mostly five leaflets on each leaf stalk; not a variety for autumn fruiting.

3. *Belle de Fontenoy* (Bunyard, Burn, & Veitch), **F.C.C.** October 3, 1865.—Canes moderately strong, spiny, and light greenish purple in colour, with five good sized leaflets on each leaf stalk; fruit in fair clusters, light crimson, and nearly round.

4. *Bountiful* (Laxton).—Canes moderately strong in growth, light purple, and spiny, with three leaflets on each leaf stalk; not a good autumn fruiter.

5. *Everbearing Feldbrunnen* (Burn), **A.M.** September 26, 1911.—Canes strong, purplish green in colour, with few spines; five leaflets on each leaf stalk; fruit in large clusters, round and large, rich crimson in colour; an excellent variety for autumn fruiting.

6. *Fastolf Surpasse* (Pfitzer), **A.M.** September 26, 1911.—Canes strong, light purplish green, and moderately spiny; five leaflets on each leaf stalk; fruit in good clusters, large, of rich crimson colour; a splendid variety for autumn fruiting.

7. *Fillbasket* (Rivers).—Canes strong, rich purple in colour, and spiny, three to five leaflets on each stalk; not a variety for autumn fruiting.

8. *Feldbrunnen* (Bunyard).—Somewhat similar to No. 5, but not quite so good.

* See footnote, p. 399.

9. Herbert (Whyte).—Canes strong, moderately spiny, and of a brownish purple colour, three leaflets on each leaf stalk; not an autumn-fruiting variety.

10. Hornet (Rivers).—Canes strong, rich purple in colour, and rather spiny; three leaflets on each leaf stalk; not an autumn-fruiting variety.

11. Merveille Rouge (Bunyard), **A.M.** September 26, 1911.—Canes moderately strong, purplish green, with few spines; three to five leaflets on each leaf stalk; fruit medium, dark crimson, and borne in great quantity.

12. November Abundance (Veitch, Burn), **A.M.** November, 1902.—Canes strong, of light purple colour, and practically spineless; five large leaflets on each leaf stalk, and leaves in abundance; fruit clusters small; fruit of fair size, and of light crimson colour.

13. October Red (Rivers).—Canes fairly strong, and of a light purple colour; three to five leaflets on each leaf stalk; leaflets elongated and light green in colour; fruit small and bright red.

14. October Yellow (Rivers).—Canes small, strong, light green, and spiny; three leaflets on each leaf stalk; fruits small, of rich flavour; borne in good clusters.

15. Perpétuel de Serrières (Burn), **A.M.** September 26, 1911.—Canes moderately strong, purplish green in colour, with few spines; three to five leaflets on each leaf stalk; fruit large, of light purple colour, freely borne; a very fine variety.

16. Perpétuel de Billard (Burn, Bunyard).—Canes very strong, light greenish purple in colour, and almost spineless; five large leaflets on each leaf stalk; fruit large, and borne in fair clusters.

17. Perpétuel (Laxton).—Canes of moderate growth; five large leaflets on each leaf stalk; fruit clusters poor; individual fruits large and of a bright red colour.

18. Red Antwerp (Rivers).—Canes moderately strong, with purple colour, and very spiny; three leaflets on each leaf stalk; not an autumn-fruiting variety.

19. Rotherfield Supreme (Yates).—Canes moderate in growth, purplish green, and spiny; five leaflets on each leaf stalk; poor fruiter.

20. Surpasse Merveille Rouge (Burn), **A.M.** September, 1911.—Canes strong, light purplish green, and with few spines; five leaflets on each leaf stalk; fruit large, dark crimson, with good clusters; a very fine variety.

21. Surprise d'Automne (Burn), **A.M.** September 26, 1911.—Canes moderately strong, light green, and spiny; three leaflets on each leaf stalk; fruit of medium size and of a light yellow colour; borne in good clusters.

22. Serridge House (Rivers).—Canes fairly strong, of a glaucous purple colour, and very spiny; three leaflets on each leaf stalk; fruit large, round, light crimson, but not a free fruiter.

23. Superlative (Rivers).—Canes very strong, rich glaucous purple

in colour, and spiny; three large leaflets on each leaf stalk; leaflets dark green and very crinkled; not an autumn-fruiting variety.

24. The Alexandra (Allan), **A.M.** October 17, 1907.—Canes moderately strong, with few spines, and light purple in colour; three leaflets on each leaf stalk; fruit small, bright crimson, and in large clusters.

25. Triumph (Burn).—Canes weak and small, with no spines; three leaflets on each leaf stalk; fruit small and in good clusters.

26. Yellow Antwerp (Rivers).—Canes moderately strong, light green, and very spiny; three to five leaflets on each leaf stalk; not an autumn-fruiting variety.

27. 5 B.— (Laxton).—Canes moderate in growth, of light purple colour, and rather spiny; three leaflets on each leaf stalk; not an autumn-fruiting variety.

CARROTS AT WISLEY, 1911.

SEVENTY-FIVE stocks of Carrots were sent for trial. All were sown on April 28. The ground had been previously trenched, thoroughly manured, and dressed with powdered chalk. An excellent germination followed, every stock coming evenly and practically true, making a most instructive trial. The crop was quite free from attack by carrot-fly, although in previous years that pest had been abundant. A Sub-Committee of the Fruit and Vegetable Committee examined the collection when growing, and expressed great surprise at finding such fine growth in so very trying a season. A quantity of each stock was lifted for their inspection. Several varieties were chosen to be placed before the full Committee, and later an exhibit of some fifty different types was made at the R.H.S. Hall. The following received awards:—

A.M. = Award of Merit.

XXX = Very Highly Commended.

Best of All (Toogood), **XXX**.

Early Gem (Sutton), **A.M.**

Early Nantes (Sydenham), **XXX**.

Golden Tankard (Gray), **XXX**.

Little Gem (Dickson and Robinson), **XXX**.

Model (R. Veitch), **XXX**.

Scarlet Model (Dickson and Robinson), **XXX**.

* 1. Altrincham (J. Veitch).—A good medium-sized long carrot, with fairly large top and a medium core.

2. Altrincham (improved) (Barr).—Very similar to No. 1, but having a slightly smaller top and a deeper colour.

3. Altrincham (selected) (Sutton).—Similar to No. 1.

4. Altrincham (selected) (Carter).—A good selection of the type having a large top and a yellow core.

5. Altrincham (Nutting).—This stock has a medium amount of top, and a rather large core having a broad yellow fringe.

6. Amsterdam (Barr).—A useful stump-rooted variety with a small top. It is dull carrot-red in colour and has a small yellowish core.

7. Best of All (Toogood), **XXX** September 19, 1911.—A good clean carrot of medium length and light red in colour. It is stump-rooted and has a medium amount of top growth.

8. Blanc des Vosges (Barr).—A white main-crop carrot, having broad parsnip-like roots and a fairly large amount of top growth.

9. Blood Red (Carter).—A good carrot of the Intermediate type, being almost blood-red in colour and having a very small core.

10. Blood Red (Barr).—Similar to No. 9, but slightly deeper in colour.

11. Blood Red (Toogood).—The roots of this stock are rather long and tapering, but in other respects similar to No. 9.

12. Champion Horn (Sutton).—A good stump-rooted carrot with a medium amount of top growth and a small core.

13. Chantenay (J. Veitch).—An excellent stump-rooted carrot with a large top growth and a medium dark carrot-red core.

15. Chantenay (Nutting).—A useful carrot of medium length and with a tapering point. It is bright carrot-red in colour and has a large top.

14. Coreless Perfection (Toogood).—A coreless variety of sausage shape with a medium amount of top growth.

16. Dainty (Toogood).—A stump-rooted variety of a light carrot-colour with a medium top and core.

17. Delicacy (Toogood).—A useful carrot-red stump-rooted variety with a medium quantity of top growth.

20. Earliest French Horn (Barr).—A carrot of most useful size and of the Early Horn type. The core is rather large and of a light carrot-red colour.

18. Early Border (J. Veitch).—A very useful light red carrot of the Early Horn type, with a small top and a medium core.

19. Early Dutch (J. Veitch).—A stump-rooted variety with a medium top. It is of a carrot-red colour and has a medium core.

21. Early French Horn (J. Veitch).—A good carrot with a fairly large amount of top and a small yellow core.

22. Early Gem (Barr).—A deep carrot-red variety of the Early Horn type, with a big top and a rather large core.

23. Early Gem or Guérande (Sydenham).—Very similar to No. 22, but with a smaller yellow core.

24. Early Gem (Sutton), **A.M.** September 26, 1911.—An excellent selection of this type. The roots are of good size, smooth, deep carrot-red in colour, and have a good quantity of top growth.

25. Early Market (Carter).—A short stump-rooted variety of a dull red colour, with an abundance of top growth and a rather large core.

26. Early Market (J. Veitch).—Similar to No. 25, but slightly paler in colour.

27. Early Nantes (Sydenham), **XXX** September 19, 1911.—A fine clean selection of this type, with medium-sized short roots of a deep red colour and having a good amount of top growth.

28. Early Scarlet Dutch (Barr).—A useful stump-rooted carrot, with a rather small quantity of foliage and a medium core of a brownish colour.

29. Early Shorthorn (Barr).—A carrot-red stump-rooted variety, with a large top and a medium core with a light edge.

30. Eureka (Dickson and Robinson).—A variety of the Intermediate type of deep carrot-red colour, and having a small top growth and a rather large core with a slight yellow fringe.

31. Favourite (Sutton).—A good tapering stump-rooted carrot with a fairly large amount of foliage. The roots are of a dull carrot-red colour.

32. French Shorthorn (R. Veitch).—A variety of the Early Horn type, with a medium top growth and a large core.

77. Golden Tankard (Gray), ~~XXX~~ September 19, 1911.—A very good, short, clean, stump-rooted variety, of a light carrot-red colour. The roots are of very regular shape and have a medium amount of top growth.

33. Guérande (Nutting).—A tapering stump-rooted variety with a medium amount of foliage and a fairly small core. The roots are deep orange-cadmium in colour.

34. Guérande (J. Veitch).—Similar to No. 33, but with a larger amount of top.

35. Improved Horn (Carter).—A stump-rooted carrot with a small amount of foliage and a medium yellow core.

36. Inimitable Forcing (Sutton).—A dull red variety of the Early Horn type, with a medium yellow core and a small top growth.

37. Intermediate (Carter).—A good selection of the type, having fine roots of a deep orange-cadmium colour and a moderate quantity of foliage.

38. Intermediate (Dobbie).—Very similar to No. 37, except that the core is a little larger and is distinctly speckled with saturnine red.

39. Intermediate Gem (Toogood).—A good dull red stump-rooted variety, with a medium-sized yellow core and a large quantity of top growth.

40. Improved Short White (Barr).—A white carrot with a rather large core and a moderate top growth. The tops of the roots are pushed a little above the soil.

41, 42. James' Intermediate (Barr, Nutting).—A fine main-crop carrot with a medium-sized core. The colour of the roots is deep orange-cadmium.

43. Large Yellow Greentop (Barr).—A variety of the Intermediate type, with a large top growth and a rather big core. The roots are reddish chrome in colour and push their tops above the soil.

44. Little Gem (Dickson and Robinson), ~~XXX~~ September 19, 1911.—A good, short, clean carrot of the Early Horn type, with a small quantity of foliage. The roots are dull red in colour and well adapted to frame-culture.

46. Long Red Nimegen (Barr).—A variety of the Intermediate type, with a moderate top growth. The roots are of a very dull orange-cadmium colour.

47, 48. Long Red Surrey (Barr, Carter).—A good selection of this well-known type.

49. Long Red Surrey (improved) (Sutton).—Similar to No. 47.

50. Long Red Surrey (selected) (Barr).—A selection differing little from No. 47.

51. Long Yellow (Barr).—A yellowish carrot of the Intermediate type, with a small quantity of top growth and a rather large core.

52. Magnum Bonum (Nutting).—A good-sized yellowish red carrot, with a large amount of foliage and rather big core. The tops of the roots are pushed above the soil.

53. Matchless (Dickson and Robinson).—A tapering stump-rooted variety with a large top and a big core. The roots are of a carrot-red colour.

54. Model (R. Veitch), **XXX** September 19, 1911.—A very fine, clean, medium-sized carrot of the stump-rooted type. The roots are blood-red in colour and the amount of top growth is fairly large.

55. Nantes (Nutting).—A stump-rooted variety with a medium yellow core and a fair amount of foliage.

56. New Intermediate (Barr).—A variety of the Intermediate type, with a moderate top growth. The roots are carrot-red in colour.

57. New Intermediate (R. Veitch), **A.M.** September 29, 1903.—Similar to No. 56, but of a rather deeper colour.

58. New Red Intermediate (Sutton).—A large carrot of the Intermediate type, with a large amount of top growth. The colour of the roots is dull carrot-red.

59. New Scarlet Intermediate (Sydenham).—A deep orange-cadmium carrot of the Intermediate type, with a moderate top growth.

60. New Short Early Forcing (Barr).—A useful stump-rooted variety, with a large quantity of foliage and a medium yellow core.

61. Parisian Forcing (J. Veitch).—A good carrot of the Early Horn type, with a small amount of top growth. The roots are carrot-red in colour.

62. Paris Market (Nutting).—A stump-rooted variety with a medium carrot-red core.

63. Red Elephant (Carter).—A variety of the Intermediate type, with a moderate top growth and a rather large yellow core. The colour of the roots is dull carrot-red.

64. Red Prince (Barr).—A tapering stump-rooted variety, with a medium quantity of foliage and a medium-sized core.

65. Scarlet Intermediate (Sutton).—A most useful carrot, with small top growth and medium core with a yellow fringe. The roots are carrot-red in colour.

66. Scarlet Model (Dickson and Robinson), **XXX** September 19, 1911.—An excellent, clean, stump-rooted variety of medium size, with a large amount of top growth and a medium core. The roots are smooth, regular in shape, and of a deep carrot-red colour.

67. Scarlet Perfection (Carter).—A rather long carrot of the Intermediate type, with a good quantity of foliage and a big yellow core.

68. Scarlet Perfection (Dickson and Robinson).—Similar to No. 67, but with a smaller core.

69, 70. St. Valery (J. Veitch, Nutting).—A good selection of this well-known carrot.

71, 72. Stump-rooted (Barr, Dobbie).—An excellent carrot, having a large amount of top growth and a medium brownish core. The roots are of a most useful size and are bright carrot-red in colour.

73. Summer Favourite (Carter).—A good small carrot of the Early Horn type, having ample foliage and a medium core. The roots are light carrot-red in colour and of regular shape.

74. Victoria (J. Veitch).—A variety of the Intermediate type, almost blood-red in colour. The amount of top growth is small and the core medium.

75. Victoria (Barr).—This variety is similar to No. 74, but slightly deeper in colour.

76. Yellow Intermediate (Barr).—A good yellow carrot with a large top growth. The tops of the roots are pushed above the soil.

POTATOS AT WISLEY, 1911.

TWENTY-NINE stocks of Potatos were sent in for trial. They were all planted on manured ground in rows three feet apart. In most cases the crop was good. The trial was inspected by a Sub-Committee of the Fruit and Vegetable Committee, and six different varieties were selected to be cooked and placed before the full Committee, afterwards receiving Awards of Merit. There was little disease.

LIST OF VARIETIES.

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|---------------------------------|---------------------------|
| *1. Arduthie Early. | 35. Beauty of Hebron. |
| 2. Beauty of Hebron. | 36. Bedowin. |
| 3. British Queen. | 37. Columbia. |
| 4. Cigarette. | 38. Conquest. |
| 5. Dalmeny Early. | 39. Dalmeny Beauty. |
| 6. Dew's Favourite. | 40. Dobbie's Prolific. |
| 7. Duchess of Buccleuch. | 41. Duchess of York |
| 8. Early Puritan. | 42. Early Regent. |
| 9. Early Rose. | 43. Emerald Queen. |
| 10. Epicure. | 44. Erin's Best. |
| 11. Harbinger. | 45. Erin's Queen. |
| 12. Imperial Beauty. | 46. Forest Ruby. |
| 13. Irish Gem. | 47. Great Scot. |
| 14. Irish King. | 48. Irish Hero. |
| 15. Jeanne Dean. | 49. Jan Ridd. |
| 16. May Queen. | 50. King Edward VII. |
| 17. Myatt's Early Prolific. | 51. Leinster Wonder. |
| 18. Ninetyfold. | 52. Morning Star. |
| 19. Ringleader. | 53. No. 100. |
| 20. Robustus. | 54. Prime Minister. |
| 21. Russet Queen. | 55. Royal Kidney. |
| 22. Scottish Chief. | 56. Royal Robe. |
| 23. Seedling. | 57. Seedling No. 1. |
| 24. Sharp's Express. | 58. Seedling No. 2. |
| 25. } Sharp's Victor. | 59. Sensation. |
| 26. } | 60. Southampton Wonder. |
| 27. Sir John Llewelyn. | 61. The Admiral. |
| 28. Snowdrop (Barr's Improved). | 62. The Chapman. |
| 29. Taylor's Early Fortyfold. | 63. The Travis. |
| 30. Tom Cobby. | 64. Toogood's Tremendous. |
| 31. Windsor Castle. | 65. Weldon. |
| 32. Abundance. | 66. Arran Chief. |
| 33. Arran Treasure. | 67. Late Seedling. |
| 34. Balgownie Seedling. | 68. Scotch Champion. |

* See footnote, p. 399.

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| 69. Snowdrift. | 75. Up-to-Date. |
| 70. Syon House Prolific. | 76. Warrior. |
| 71. The Darlington. | 77. Nonsuch. |
| 72. The Diamond. | 78. Pride of Surrey. |
| 73. } The Factor. | 79. Hatton Beauty. |
| 74. } | |

F.C.C. = First-class Certificate.

A.M. = Award of Merit.

EARLY VARIETIES.

1. Arduthie Early (Smith), **A.M.** August 1, 1911.—Flowers, white; haulm dark green, weak; tubers good size, round kidney, white; eyes very shallow; eyebrows indistinct; crop good; not diseased.

2. Beauty of Hebron (Barr), **A.M.** August 14, 1900.—Flowers white; haulm light green, weak; tubers very uneven in size, round kidney, white; eyes sunken; crop large; slightly diseased.

3. British Queen (Barr), **A.M.** August 15, 1905.—Flowers white; haulm dark green, strong; tubers medium, round, white; eyes sunken; eyebrows prominent; crop large; not diseased.

4. Cigarette (Barr), **A.M.** November 21, 1905.—Flowers none; haulm dark green, weak; tubers small, round, white; eyes shallow; eyebrows not prominent; crop very good.

5. Dalmeny Early (Barr), **A.M.** September 13, 1910.—Flowers white; haulm light green, weak; tubers medium, round kidney, white; eyes sunken; eyebrows not prominent; crop good.

6. Dew's Favourite (Dew), **A.M.** August 2, 1910.—Flowers white; haulm light green, strong; tubers small, round, white; eyes sunken; eyebrows not prominent; crop good.

7. Duchess of Buccleuch (Dobbie).—Flowers white; haulm light green, weak; tubers large, round kidney, white; eyes shallow; eyebrows indistinct; crop good.

8. Early Puritan (Barr), **A.M.** August 16, 1900.—Flowers white; haulm light green, weak, tubers medium, round, white; eyes sunken; eyebrows distinct; crop good.

9. Early Rose (Barr).—Flowers white; haulm light green, weak; tubers very large, round, yellow; eyes very sunken; eyebrows distinct; crop good.

10. Epicure (Barr), **A.M.** August 15, 1905.—Flowers white; haulm dark green, strong; tubers large, round, white; eyes sunken; eyebrows not prominent; crop good.

11. Harbinger (Barr), **A.M.** August 5, 1897.—Flowers mauve; haulm light green, weak; tubers uneven in shape and size, white; eyes slightly sunken; eyebrows not prominent; crop heavy.

12. Imperial Beauty (Barr).—Flowers white; haulm light green, strong; tubers medium, round kidney, white; eyes sunken; eyebrows not prominent; crop very heavy.

13. Irish Gem (Sands).—Flowers white; haulm dark green, weak; tubers large, round kidney, white; eyes sunken; eyebrows not prominent; crop good.

14. Irish King (Barr).—Flowers mauve; haulm light green, strong; tubers small, round, white; eyes sunken; eyebrows not prominent; crop good.

15. Jeanne Dean (Holmes), **F.C.C.** October 10, 1893.—Flowers white; haulm dark green, strong; tubers medium, round, white; eyes sunken; eyebrows prominent; crop good.

16. May Queen (Barr), **A.M.** August 15, 1905.—Flowers mauve; haulm light green, strong; tubers large, round kidney; eyes shallow; eyebrows distinct; crop good.

17. Myatt's Early Prolific (Barr).—Flowers light mauve; haulm dark green, weak; tubers small, flat kidney, white; eyes sunken; eyebrows indistinct; crop good.

18. Ninetyfold (Barr), **A.M.** July 10, 1900.—Flowers white; haulm light green, weak; tubers irregularly round, medium, white; eyes sunken; eyebrows distinct; crop fairly good.

19. Ringleader (Barr), **A.M.** July 10, 1900.—Flowers none; haulm dark green, strong; tubers medium, round kidney, white; eyes fairly shallow; eyebrows none; crop heavy.

20. Robustus (Roberts).—Flowers white; haulm light green, weak; tubers small, round, white; eyes deeply sunken; eyebrows none; crop heavy.

21. Russet Queen (Holmes), **A.M.** October 23, 1906.—Flowers white; haulm dark green, strong; tubers medium, round, white; eyes sunken; eyebrows prominent; crop heavy.

22. Scottish Chief (Barr).—Flowers mauve; haulm light green, strong; tubers small, round, white; eyes sunken; eyebrows none; crop heavy.

23. Seedling (Lloyd).—Flowers white; haulm light green, weak; tubers medium, flat kidney, white; eyes sunken; eyebrows distinct; crop heavy.

24. Sharp's Express (Barr).—Flowers mauve; haulm dark green, strong; tubers large, round kidney, white; eyes sunken; eyebrows prominent; crop heavy.

25, 26. Sharp's Victor (Barr, Holmes), **A.M.** August 14, 1900.—Flowers white; haulm dark green, weak; tubers medium, round kidney, white; eyes shallow; eyebrows prominent; crop heavy.

27. Sir John Llewelyn (Barr), **A.M.** September 11, 1900.—Flowers white; haulm dark green, strong; tubers large, flat kidney, white; eyes shallow; eyebrows none; crop heavy.

28. Snowdrop [Barr's Improved] (Barr), **F.C.C.** August 30, 1883.—Flowers white; haulm light green, weak; tubers medium, round, white; eyes sunken; eyebrows not prominent; crop heavy.

29. Taylor's Early Fortyfold (Holmes).—Flowers none; haulm light green, strong; tubers medium, round, purple; eyes very sunken; eyebrows prominent; crop fair.

30. Tom Cobley (R. Veitch).—Flowers white; haulm light green, strong; tubers medium, round kidney, white; eyes shallow; eyebrows none; crop large.

31. Windsor Castle (Barr), **F.C.C.** September 12, 1893.—Flowers white; haulm dark green, strong; tubers small, round, white; eyes shallow; eyebrows prominent; crop fair.

MAINCROP, INCLUDING MID-SEASON.

32. Abundance (Holmes).—Flowers white; haulm light green, strong; tubers large, flat kidney, white; eyes shallow; eyebrows indistinct; crop fair.

33. Arran Treasure (Mackelvie).—Flowers white; haulm dark green, weak; tubers small, flat kidney, white; eyes slightly sunken; eyebrows none; crop fair.

34. Balgownie Seedling (Yule), **A.M.** September 26, 1911.—Flowers mauve; haulm light green, strong; tubers medium, flat kidney, white; eyes shallow; eyebrows prominent; crop very good.

35. Beauty of Hebron (J. Veitch), **A.M.** August 14, 1900.—For description see No. 2. Stock requires more selection.

36. Bedowin (Moore).—Flowers white; haulm dark green, strong; tubers medium, flat kidney, white; eyes sunken; eyebrows prominent; crop fair; slightly diseased.

37. Columbia (J. Veitch).—Flowers white; haulm light green, weak; tubers very small, round kidney, white; eyes shallow; eyebrows none; crop very poor.

38. Conquest (J. Veitch).—Failed; only a dozen very small tubers to three plants.

39. Dalmeny Beauty (Sydenham), **A.M.** September 11, 1903.—For description see No. 5.

40. Dobbie's Scottish Prolific (Dobbie), **A.M.** September 26, 1911.—Flowers mauve; haulm light green, strong; tubers large, flat kidney, white; eyes shallow; eyebrows not prominent; crop good.

41. Duchess of York (Sands).—Flowers white; haulm dark green, weak; tubers large, flat kidney, white; eyes shallow; eyebrows prominent; crop very fair.

42. Early Regent (J. Veitch), **F.C.C.** October 10, 1893.—Flowers white; haulm dark green, strong; tubers good size, round kidney, white; eyes shallow; eyebrows prominent; crop fair.

43. Emerald Queen (Sands).—Flowers white; haulm dark green, weak; tubers small, round kidney, white; eyes very sunken; eyebrows prominent; crop good.

44. Erin's Best (Sands).—Flowers mauve; haulm dark green, strong; tubers medium, round, white; eyes sunken; eyebrows prominent; crop good.

45. Erin's Queen (Sands), **A.M.** September 26, 1911.—Flowers white; haulm dark green, strong; tubers medium, flat kidney, white; eyes sunken; eyebrows none; crop good.

46. Forest Ruby (Toogood).—Flowers mauve; haulm light green,

weak; tubers small, flat kidney, red; eyes shallow; eyebrows distinct; crop fair.

47. Great Scot (R. Veitch), **A.M.** September 26, 1911.—Flowers none; haulm dark green, weak; tubers large, round, white; eyes sunken; eyebrows distinct; crop good.

48. Irish Hero (Sands).—Flowers white; haulm dark green, strong; tubers medium, very irregular in shape; eyes shallow; eyebrows distinct; crop fair.

49. Jan Ridd (R. Veitch).—Flowers white; haulm dark green, strong; tubers medium, round, white; eyes sunken; eyebrows not prominent; crop good.

50. King Edward VII. (J. Veitch).—Flowers none; haulm dark green, strong; tubers flat kidney, white tinged with red; eyes shallow; eyebrows indistinct; crop poor.

51. Leinster Wonder (Sands).—Flowers none; haulm dark green, strong; tubers small round, white, netted; eyes shallow; eyebrows prominent; crop good.

52. Morning Star (Sands).—Flowers mauve; haulm dark green, strong; tubers small, round, white; eyes shallow; eyebrows distinct; crop fair.

53. No. 100 (Dobbie).—Flowers white; haulm light green, weak; tubers fair sized, round kidney, white; eyes shallow, eyebrows indistinct; crop good.

54. Prime Minister (Rev. S. C. Fry).—Flowers none; haulm dark green, weak; tubers medium, round kidney, yellow; eyes sunken, eyebrows distinct; crop fair.

55. Royal Kidney (J. Veitch).—Flowers none; haulm light green, weak; tubers small, round but irregular; eyes shallow; eyebrows distinct; crop small.

56. Royal Robe (Morton).—Flowers mauve; haulm dark green, weak; tubers large, flat kidney, purple; eyes shallow; eyebrows indistinct; crop poor; diseased.

57. Seedling No. 1 (Rutter).—Flowers mauve; haulm light green, strong; tubers medium, flat kidney, white; eyes slightly sunken; eyebrows indistinct; crop good.

58. Seedling No. 2 (Rutter).—Flowers mauve; haulm dark green, weak; tubers large, round, white; eyes sunken; eyebrows indistinct; crop good.

59. Sensation (J. Veitch).—Flowers mauve; haulm light green, strong; tubers medium, round kidney, white; eyes sunken; eyebrows distinct; crop good.

60. Southampton Wonder (Toogood).—Flowers none; haulm dark green, strong; tubers large, round kidney, yellow; eyes sunken, eyebrows not prominent; crop good.

61. The Admiral (Dobbie).—Flowers white; haulm dark green, strong; tubers medium, round kidney, white; eyes sunken; eyebrows not prominent; crop fair.

62. The Chapman (Dobbie).—Flowers mauve; haulm light green,

strong; tubers small, flat kidney, white; eyes shallow; eyebrows distinct; crop good.

63. The Travis (Dickson and Robson).—Flowers white; haulm light green, weak; tubers medium, round, yellow; eyes sunken; eyebrows not prominent; crop fair.

64. Toogood's Tremendous (Toogood), **A.M.** September 26, 1911.—Flowers mauve; haulm light green, strong; tubers large, flat kidney, white; eyes shallow; eyebrows none; crop very good.

65. Welldon (Dickson and Robson).—Flowers white; haulm light green, weak; tubers medium, round kidney, white; eyes sunken; eyebrows distinct; crop fair.

LATE VARIETIES.

66. Arran Chief (Mackelvie).—Flowers none; haulm dark green, strong; tubers small, round, white; eyes shallow; eyebrows indistinct; crop very good.

79. Hatton Beauty (Laurie).—Flowers none; haulm dark green, strong; tubers small, irregular, white; eyes shallow; eyebrows indistinct; crop poor.

67. Late Seedling (Mackenzie).—Flowers none; haulm light green, strong; tubers medium, round, purple; eyes sunken; no eyebrows; crop good.

77. Nonsuch (Perry).—Flowers none; haulm light green, weak; tubers small, round, white; eyes sunken; eyebrows indistinct; crop very poor.

78. Pride of Surrey (Perry).—Flowers none; haulm dark green, weak; tubers small, round, purple; eyes very shallow; eyebrows none; crop very poor.

68. Scotch Champion (Holmes), **F.C.C.** December 16, 1879.—Flowers none; haulm dark green, strong; tubers small, round and irregular, white; eyes sunken; no eyebrows; crop fair.

69. Snowdrift (J. Veitch).—Flowers mauve; haulm light green, weak; tubers large, flat kidney, white; eyes sunken; eyebrows distinct; crop good.

70. Syon House Prolific (J. Veitch), **F.C.C.** April 11, 1905.—Flowers white; haulm light green, weak; tubers small, flat kidney, white; eyes shallow; eyebrows distinct; crop poor.

71. The Darlington (Kent and Brydon).—Flowers white; haulm dark green, strong; tubers large, flat kidney, white; eyes shallow; eyebrows distinct; crop good.

72. The Diamond (Barr).—Flowers white and mauve; haulm light green, strong; tubers large, flat kidney, white; eyes shallow; eyebrows indistinct; crop very good.

73, 74. The Factor (Barr, Sydenham), April 25, 1905.—Flowers mauve; haulm light green, strong; tubers large, round kidney, white; eyes sunken; eyebrows indistinct; crop very good.

75. Up-to-Date (Barr).—Flowers mauve; haulm light green,

strong; tubers large, flat kidney, white; eyes shallow; eyebrows indistinct; crop good.

76. Warrior (Holmes).—Flowers mauve; haulm light green, strong; tubers medium, flat kidney, white; eyes shallow; eyebrows not prominent; fair crop.

The following varieties were sent by Mr. Sands, and were tubers produced in 1910 by late-planted sets on ground from which a crop of early potatoes had already been lifted:—

1. British Queen (Sands), **A.M.** August 15, 1905.—Haulm strong; tubers large, white; crop large; mid-season.

2. Epicure (Sands), **A.M.** August 15, 1905.—Tubers large, round kidney; crop fair; mid-season.

3. Table-Talk (Sands).—Tubers large, white; crop very good; mid-season.

SAVOYS AT WISLËY, 1911.

FIFTY-NINE stocks of Savoys were sent for trial. The seed was sown on March 25 on seed beds, and the resulting plants transplanted in rows, allowing a distance of two feet each way. Although the season was a very hot and trying one, the plants grew well. They were examined by a Sub-Committee of the Fruit and Vegetable Committee when growing, and the following were very highly commended (**XXX**):—

Cannonball (Toogood).	Maincrop (Wheeler).
Ironhead (Nutting).	New Year (Sutton).
Large Aubervilliers (Barr).	Reliance (Sutton).
Late Drumhead (Nutting).	

1. Best of All (Sutton).—A fairly large variety of the dwarf Drumhead type, with large, crinkled, glaucous, outer leaves, and a round, firm, light green heart. It is a good mid-season variety.

2. Cannonball (Toogood), **XXX** September 19, 1911.—A good early variety of the Dwarf Early Ulm type. It is of medium size, and has much-crinkled, dark green outer leaves, and a solid, light green heart.

3. Climax (Barr).—A rather poor variety of the Drumhead type, which fails to make a good heart.

4. Climax (Toogood).—A compact-growing, late variety, with medium-sized, firm heart, and much-crinkled leaves.

5. De Vertus (J. Veitch).—A useful mid-season variety of the Drumhead type; outer leaves slightly glaucous, coarsely crinkled, large; heart large and firm.

6. Drumhead (Barr).—A good late Savoy of medium size, with firm, round heart, and large glaucous outer leaves.

7. Drumhead (selected) (Sutton).—A compact-growing selection of this type, with good, firm heart, and much-crinkled, dark green outer leaves.

8. Dwarf Abberville (Barr).—A small, compact-growing Savoy, with small, firm heart, and glaucous coarsely-crinkled outer leaves. It is of the Dwarf Drumhead type, and turns in late.

9. Dwarf Green Curled (Barr).—A good, medium-sized Savoy of the Drumhead type, with a firm heart, and dark green, finely-crinkled outer leaves.

10. Dwarf Green Curled (improved) (Sutton).—A variety of the Tall Ulm type, with small, firm heart, and dark green, finely-crinkled outer leaves. It is an excellent mid-season Savoy.

11, 12. Earliest of All (Sutton, Barr).—A medium-sized Savoy of the Early Ulm type, having dark green outer leaves, and light green, firm heart.

13. *Early Favourite* (Toogood).—A compact grower of the *Early Ulm* type, with medium, dark green, much-crinkled outer leaves, and small, firm heart of a light green colour.

14. *Early Gem* (Wheeler).—Very similar in type to No. 13, but with slightly larger hearts.

15. *Early Market* (J. Veitch).—A small, compact grower, which turns in early and stands well. The heart is small and firm, and the leaves are much crinkled.

16. *Early Midsummer* (J. Veitch).—A good, medium-sized Savoy of the *Early Ulm* type; the outer leaves are small, the heart firm, round, and light green.

17. *Early Monarch* (Toogood).—A variety of the *Early Ulm* type, with dark green outer leaves, and a small heart.

18. *Early Sugarloaf* (Toogood).—A useful mid-season Savoy of the *Sugarloaf Drumhead* type; the outer leaves are dark green, long, and narrow, of upright growth, and much crinkled; the heart is rather small, but firm, and of a long, conical shape.

19. *Early Ulm* (Nutting).—An excellent stock of this well-known type, with very firm and solid, light green heart, and ample outer foliage of a dark green colour, and much crinkled.

20. *Early Wonder* (Toogood).—A rather large variety of the *Early Ulm* type, having the outer leaves much crinkled and slightly glaucous; the heart is of good size, roundish, light green, and firm.

21. *Early Dwarf Vienna* (J. Veitch).—A very sturdy Savoy of the *Early Ulm* type, with very solid, light green heart, and abundant dark green, much-crinkled outer foliage.

22. *Epicure* (Toogood).—A small compact grower of the *Early Ulm* type, with slightly glaucous, finely-crinkled outer leaves, and small, very firm heart of light green.

23. *Giant Globe* (Nutting).—A large *Drumhead* Savoy, having glaucous outer leaves, and large, round, solid heart. It comes into use early.

24. *Gilbert's Universal* (Barr), **F.C.C.** March 25, 1884.—A vigorous grower of the *Drumhead* type; the outer leaves are large and dark green; the hearts vary somewhat in shape in this stock, but are very firm and of a very useful size.

25. *Golden Globe* (Barr).—A good Savoy of the *Tall Ulm* type; it turns in early, and has a light green heart of large size and great firmness, and slightly glaucous outer leaves.

26. *Golden Market* (Barr).—A Savoy of the *Drumhead* type, with a rather dwarf habit; the heart is medium sized and firm, but the stock requires a little more selection.

27, 28.—*Green Curled* (R. Veitch, J. Veitch).—A good variety of the *Tall Ulm* type, with splendid hearts of large size, and finely crinkled outer leaves of dark green. This variety stands well.

29. *Green Curled* (Nutting).—Similar to No. 27, but turns in earlier.

30. *Green Favourite* (Barr).—A small, compact grower of the

Early Ulm type, with dark green outer leaves and a small heart. It quickly runs to seed.

31. Green Globe (Barr).—A useful variety of the Early Ulm type; it is a medium grower, and has a good-sized, firm heart; the outer leaves are slightly glaucous.

32. Ironhead (Nutting), **XXX** September 19, 1911.—A fine, very early variety of compact habit, with medium outer leaves of dark green, and very firm, roundish heart, which is of medium size and light green in colour. It is of the Early Ulm type.

33. Jewel (Toogood).—A medium-sized variety of the Early Ulm type, with dark green, crinkled outer leaves, and light green heart. The stock requires a little more selection.

34. Large Aubervilliers (Barr). **XXX** September 19, 1911.—A very fine medium Savoy of the Dwarf Drumhead type; the outer leaves are rather large, and much crinkled and glaucous in colour; the hearts are round, light green, of good useful size, and very firm.

35. Large Vertus (Barr).—This is apparently a cross between a Drumhead cabbage and a Drumhead Savoy. The outer leaves are smooth and glaucous; the hearts are large, firm, and round.

36. Late Drumhead (Nutting), **XXX** September 19, 1911.—A fine late Savoy of this well-known type.

37. Large Drumhead (improved) (McKenzie).—A tall Savoy, which failed to heart well early in the season, but produced a firm, useful heart later.

38, 39. Late Drumhead (R. Veitch, Sutton).—A large Savoy, with a big, firm heart, and glaucous outer leaves.

40. Late Erfurt (Barr).—A compact grower, with dark green medium outer leaves, much crinkled; the heart is small, and many of the plants quickly run to seed.

41. Lightning (Barr).—A variety of the Drumhead type of moderate size, and producing a good, firm heart early in the season.

42. Maincrop (Wheeler), **XXX** September 19, 1911.—A good, early, medium-sized variety of the Drumhead type; the outer leaves are glaucous, and the hearts firm and solid.

43. New Cone-headed (Barr).—A variety of the Sugarloaf Drumhead type, having the outer leaves long and rather narrow, much crinkled, dark green in colour, and upright in growth; the hearts are small, but very firm, and of a long conical shape.

44. New Summer (Barr).—A good Savoy of the Early Ulm type, with dark green outer leaves; the heart is compact, of medium size, very firm, and turns in quickly.

45. New Year (Sutton), **XXX** September 19, 1911.—A good, late Drumhead variety, with large outer leaves, much crinkled, and glaucous in colour; the heart is of medium size and very firm.

46. Norwegian (Barr).—A large, vigorous grower of the Late Drumhead type, with coarse glaucous outer foliage, having a slight purple tinge; the heart is very firm and of medium size.

47. Ormskirk (Nutting).—A medium-sized Savoy of the Late Drum-

head type, having slightly glaucous outer leaves. Most of the plants had firm, medium hearts, but a few did not heart up well.

48. Ormskirk (J. Veitch).—A very large late Drumhead variety, producing a good, firm heart.

49. Perfection (Sutton).—A very useful, small, compact variety of the Early Ulm type, with slightly glaucous outer leaves, and a small, firm heart.

50. Perfection (Toogood).—A good Drumhead variety, with large glaucous outer leaves considerably crinkled; the heart is of good size, firm, and light green in colour.

51. Princess May (Toogood).—A Drumhead variety, with large, slightly glaucous outer leaves, and a rather small, bright green, firm heart. This variety stands well.

52. Reliance (Sutton), ~~XXX~~ September 19, 1911.—An excellent Savoy of the Early Ulm type, with medium, dark green outer leaves, much crinkled; the heart is conical in shape and very firm.

53. Stonehead (Barr).—A good, medium-sized Drumhead Savoy, with large, dark green outer leaves; the heart turns in early, and is large, very firm, round, and light green.

54. Sugar Loaf (Sutton).—A useful variety of the Sugarloaf Drumhead type; it is a most distinct, long, conical Savoy, with much-crinkled, dark green outer leaves, and firm solid hearts. It turns in early and is a moderate grower.

55. Tom Thumb (Sutton).—A compact, much-crinkled variety of the Early Ulm type, with slightly glaucous leaves; the heart is small, firm, rather conical in shape, and turns in early.

56. Very Dwarf (Barr).—A variety of the Early Drumhead type of prostrate habit, with its slightly glaucous outer leaves close to the ground; the heart is round, firm, of useful size, and is ready early.

57. Victoria (Barr).—A useful, medium-sized Savoy of the Early Drumhead type, with much-crinkled outer leaves, and a firm, light green heart, which turns in early.

58. Vienna Frame (Barr).—The stock of this variety needs a little more selection. Most of the Savoys produced from it were of a useful size, with firm hearts, and rather large outer foliage.

59. Yellow Winter (Barr).—An excellent, late, golden form of Drumhead Savoy, with large, slightly glaucous outer leaves, and a good firm, solid heart of a yellow colour.

APPLIANCES, MANURES, &c., TRIED AT WISLEY, 1911.

Corvusine (A. E. Hawker).—A preparation for protecting seed from birds, &c. We were unable to detect any difference in the germination of seed treated with it.

Arsenate of Lead (Voss).—An excellent preparation when used as recommended for spraying fruit trees to kill the caterpillar of the winter-moth, &c.

Carlton Sweet Pea Manure (Voss).—An exceedingly good manure for sweet peas, particularly on light, hot soils, if a sprinkling is given periodically during the summer and well watered in.

Naphtho-Nicotyl (Voss).—A soil fumigant of great value for destroying wire-worm, &c., in the soil. We have found it particularly useful for dressing ground intended for carrots and like crops.

Woburn Bordeaux Paste (Voss).—A good and effective paste when applied according to instructions, which must be adhered to.

Caustic Soda Crystals (Voss).—Useful as a winter-wash when dissolved and used as a spray.

Ivo Label (Permanent Printing Co.).—A very neat and useful little label.

Patent Ribbon Wire (Lane Bros.).—We have not found this lasting or to be of much value.

Patent Combination Metallic Labels (Lane Bros.).—These are on trial, and up to the present appear to stand well.

Slug-killer (Turner).—We did not find this to be better than some preparations already on the market.

New Patent Weeder (Willoughby).—We do not consider this so good as some, being of little use unless on hard paths.

Pots (Elie Mahy).—These red earthen pots are well moulded and burned, and of good colour. They are made in a variety of sizes, but of a shape quite different from the usual, being much wider in the middle than above or below—like a fish-globe, in fact. While no doubt strongly rooting plants will be at home in them, it is impossible to 'pot on' plants from a smaller to a larger size without either grievously damaging the roots or breaking the pot. The greater bulk of soil would also be rather likely to get sour with more slowly rooting plants. We are now trying them for orchid potting.

BOOK REVIEWS.

"Mendelism." By Professor R. C. Punnett. Ed. 3. 8vo., xiv + 176 pp. (Macmillan, London, 1911.) 5s. net.

When the first edition of this little book was published in 1905 it immediately made its mark. It dealt in such a clear, and withal in such an accurate, manner with the subject, and was written in so pleasing a style, that it appealed to large numbers of those interested in the principles of inheritance.

The third edition has attained to more than double the bulk, and many changes from the first have been made. New matter has been accumulated and digested; new light has been thrown on old investigations; changes in the direction of simplification, and discoveries needing new theories to explain them, have been made.

Evidence of the working of the same laws has been obtained from many different groups of living things, and the results of the consideration of this evidence are written in this new edition no whit less clearly or less accurately than in the first. We miss perhaps something of the attitude of the student which was evident in the first edition, and see, perhaps, more of the attitude of the professor, but of that one must not complain, for the author is evidently a thoroughly convinced "Mendelian." We heartily recommend the book as a reliable and readable account of the outcome of Gregor Mendel's work.

"British Fungi, with a Chapter on Lichens." By G. Massee. 8vo., x + 551 pp. (Routledge, London, 1911.) 7s. 6d. net.

The name of the author is sufficient recommendation of this book, for no one is in a better position than he to write such a book, and probably no one, at any rate of the present generation, has worked so assiduously as he at the group. It will therefore suffice to indicate briefly its contents. An Introduction dealing with the natural history of fungi and the broad lines of their classification is followed by descriptions of the species, and these are illustrated with admirable coloured plates.

Only the larger fungi are dealt with, of course, and but few of the lichens, but the book is one that should be in the hands of all who desire to know something of the fungi they meet with in their autumn walks.

"An Introduction to Vegetable Physiology." By J. Reynolds Green, Sc.D., F.R.S. Ed. 3. 8vo., xxii + 470 pp. (Churchill, London, 1911.) 10s. 6d. net.

Several modifications have been made in the present edition of this deservedly well-known book, bringing it into line with recent research and adding to its lucidity or completeness.

It is a well-illustrated account of the manner in which a plant's physiological needs are met in its structure, and might with advantage be studied by serious students of Botany. The subjects of respiration and assimilation, two diametrically opposite functions continually confused with one another by students, are dealt with in a very clear manner and are among the best chapters in an excellent book.

"Plant Physiology, with Special Reference to Plant Production." By B. M. Duggar, Ph.D. 8vo., xv + 516 pp. (Macmillan, New York, 1911.) 7s. net.

This is a text and reference book, and is intended for the general reader as well as for the student who is preparing to grow plants.

An excellent general account of plant physiology is given, and the special physiology of certain processes connected with plant propagation, &c., are dealt with in their proper places.

The book is well illustrated and well indexed.

"The Student's Lyell." Ed. by J. W. Judd. Ed. 2. 8vo., [56] + 645 pp. (Murray, London, 1911.) 7s. 6d. net.

So well known to students and teachers is the first edition of this book that it is quite unnecessary to do more than express a hearty welcome of this second thoroughly revised edition.

As the author in the Preface says, the general acceptance of the principles of evolution, "the logical sequel to the 'Principles of Geology,'" lends a new interest to the writings of Sir Charles Lyell, and those whose interest leads them to study the history and structure of the earth, and who have not yet made acquaintance with "The Student's Lyell," will find in it an inspiring guide.

"Round the Year with Nature." By W. J. Claxton. 8vo., xvi + 302 pp. (Routledge, London, 1911.) 7s. 6d. net.

Still another "Nature Knowledge" book, this time written in fairly simple language for boys and girls, and based upon the sequence of the months, beginning with September.

Like most of its kind it is not free from error. For instance, it speaks of the turnip sawfly and the gooseberry sawfly as being one and the same, and of the fall of the leaf being the result (?) of the *approaching* winter gales, completely ignoring the question of water supply and demand.

It is, however, a book that would interest and stimulate the observing powers of the young people for whom it is intended, particularly as it contains a number of well-coloured plates.

"The Agricultural and Forest Products of British West Africa." By Gerald C. Dudgeon. 8vo., x + 170 pp., with maps and illustrations. (John Murray, London, 1911.) 5s. net.

This is the first volume of the Imperial Institute Series of hand-books to the commercial products of the tropics. It is edited by

Professor Wyndham R. Dunstan, Director of the Imperial Institute, and issued under the authority of the Secretary of State for the Colonies. The author, Mr. Dudgeon, was until recently Inspector of Agriculture for British West Africa, and has therefore first hand information on the subject with which this volume deals.

The British colonies and protectorates on the West Coast of Africa comprise the Gambia and Sierra Leone, the Gold Coast and Ashanti, Southern Nigeria and Northern Nigeria. From these countries are derived such important products as cotton and other fibres, rubber, oil-seeds, cocoa, copal resin and other gums, timber, &c., all of which are important to the producer in the tropics as well as to the merchant and manufacturer at home. It is with a view to making known the resources of our West African possessions for the supply of such commodities as those mentioned that the Imperial Institute handbooks are published; but the editor expresses the hope that they will be of use not only to the merchant and manufacturer, but also of interest to students of Imperial and national problems, as well as a valuable aid to the teaching of commercial geography. As far as possible non-technical language has been employed in describing the products, and references in many cases are given to other publications of the Imperial Institute, which will enable those who so desire to obtain information of a more scientific or technical nature than that which comes within the scope of the handbook.

The book is well produced, and clear, easily readable type has been employed; the coloured maps which accompany the descriptions of the various countries are distinct in lettering and up to date. Numerous reproductions of photographs illustrate the book, but as several pictures are included on one page they are necessarily small and less informative than they would have been had they been reproduced on a larger scale. A full index adds greatly to the value of the book.

“Gravetye Manor, or Twenty Years’ Work Round an Old Manor House.” By William Robinson. Imperial 4to., 160 pp. (Murray, London, 1911.) Bound in vellum, £3 3s. net.

It is seldom indeed that any country gentleman combines the four essential requisites for the publication of such a splendid book as “Gravetye Manor.” Few possess (1) a property so interesting as Gravetye; fewer still possess (2) the ability and knowledge to write such an account of their property; and not over many possess (3) the leisure, or (4) the means, to produce so gloriously set forth a volume. To begin at the outside: It is bound in old white vellum, the covers being tied together with green silken strings. The paper used is the finest English hand-made, with rough edges; and the type is from special matrices to be found only at the Oxford University Press, where it has been printed. It is illustrated with a number of fine etchings and engravings.

But when we come to the contents, what shall we say? What can

we say, or what needs saying, beyond the record of the author's name? Who is hardy enough, or ignorant enough, to venture to appraise a book written by William Robinson? The simple mention of the name is all-sufficing. In the Preface Mr. Robinson tells us his object in issuing the book. Twenty years ago, by good fortune and good judgment he became possessed of an old Tudor Manor house, which, with its surrounding gardens, pleasaunces, fields, and woods, had been for long neglected; and he set himself to work lovingly to restore it all to, possibly even more than, its pristine loveliness; and, "I thought that the record (of my work) might be of use to others who are striving to get all the beauty that is possible out of a neglected country place, or one being formed anew. Everything was done with regard to landscape beauty." And then the book itself tells all the details of what he did and how he did it—we say advisedly "all the details," for, like the true artist, no detail is too small for consideration of the master mind—and the records deal with everything from oaks to water-lilies, and from rabbits to foot-scrappers.

"Gravetye Manor" will make a delightful present; the donor will know that he is giving something which is genuinely worth having, and the recipient will know that many most enjoyable hours by the winter fireside are before him, together with stores on stores of well-digested, well-thought-out hints of how he may improve his property, and on which he can set to work as soon as the frost breaks.

"Sugar Beet." By "Home Counties." 8vo., xx + 424 pp. (Horace Cox, London.) 6s. net.

From the beginning to the end of this book the hand of an expert is apparent. From every conceivable standpoint the subject is dealt with in a remarkably impartial manner. A mine of information, it can be heartily recommended. Those having access to the Lindley Library may see it there, but will desire to possess a copy if at all interested in the subject. The conclusions are:—"The probable beet root areas of England are superior to those of either Germany or France. We have large areas of land suitable, and any land which will grow good mangels will grow good beet, provided it is not too wet, marshy, or badly drained, is not very stiff retentive clay—this because of expense—or perhaps, peaty soil. It is found on peaty or moorland soils the sugar content is lower. Sufficient depth is essential." Labour in this country is probably suitable and sufficient.

"Outlines of Biology." By P. Chalmers Mitchell and G. P. Mudge. Ed. 4, 8vo., xvi + 348 pp. (Methuen, London.) 6s. net.

This book is written for students preparing for the Conjoint Board Examinations. It is very like other books written with a similar aim, except that the authors, wherever the opportunity occurs, emphasize their conviction that the characters shown by an organism depend upon the nature of the organism's parentage rather than on the environment past or present; its character is more a matter of Nature than nurture.

"Southern Field Crops." By J. F. Duggar. Crown 8vo., xxviii + 580 pp. (Macmillan, London.) 7s. 6d. net.

Prepared for practical farmers and students desirous of obtaining a full practical knowledge of the field crops grown in Southern America. The following crops are dealt with:—Oats; wheat; barley; rye; maize; rice; sorghums; cotton; hemp; sweet potatoes; pea nuts; sugar-cane and tobacco. Maize and cotton are most fully dealt with, and but for the fact that those plants are not largely grown in the British Isles this work would be extensively used here. The methods of teaching, and the information conveyed, are thoroughly excellent. Interesting and instructive to the student of science, it is the practical grower who will most appreciate this book. It cannot be too strongly eulogized.

"The Bulb Book; or, Bulbous and Tuberous Plants for the Open Air, Stove, and Greenhouse." By John Weathers. 8vo., 471 pp. (John Murray, London, 1911.) 15s. net.

This is probably the largest and most complete book on bulbs that has yet been issued, embracing hardy, half-hardy, stove, and greenhouse bulbs and tubers, with excellent descriptions of their propagation and cultivation. The print is good, and there are over three hundred figures. Some of these figures are very good, and some indifferent; still, they show the form of the flower, &c., they are meant to represent. Some of the plants named can scarcely be termed bulbous or tuberous, but they are so close to one or the other that they are not out of place. Many plants are mentioned that are seldom met with except in botanic gardens or the garden of an enthusiastic collector. All the groups of plants are carefully classified, with the name of their family. The cultivation of bulbs in the open air has developed immensely of late years, and this portion of the book will interest the majority of readers most. Parks, shrubberies, woodlands, orchards, and other places, formerly so dull in many places, are now, by the aid of bulbs, made most attractive parts of the estate. Regarding the depth bulbs should be planted, the author says it is a good rule to cover the bulb, corm, or tuber with twice its own depth in soil; our experience is that all the large-flowered varieties of *Narcissus* succeed best if planted nine inches or a foot deep in grass or cultivated soil. Again, the advice as to covering *Alstroemerias* in September with well-decayed manure may be safe in light, porous soils, but on heavy ground it keeps the soil wetter and colder than it would be without the manure. The book concludes with a first-rate glossary of technical terms and a very good index.

"Rhododendrons and Azaleas." By William Watson, A.L.S., Curator of the Royal Botanic Gardens, Kew. 8vo., 116 pp. (Messrs. Jack, London, 1911.) 1s. 6d. net.

Sir Fred. W. Moore in writing the Preface for this book justly makes these remarks: "It is difficult to understand why a book

on Rhododendrons, within the means of ordinary gardening folk, has been so long in making its appearance. That there has been a steady and growing demand for such a book is a well-known fact." Every Rhododendron and Azalea lover will agree that no one is better qualified to write such a book than Mr. Watson, the collection at Kew Gardens being unique. Mr. Watson has also visited the most famous nurseries in which they are a speciality, and such noted gardens as Tregothnan, Ivernough, Tresco, Penjerrick, and many other well-known places, but in every instance lime is absent where Rhododendrons or Azaleas are a success. Peat, leaf soil, and other soils may be introduced, but if there is lime in the soil or water, they are doomed to failure. Much money and time is wasted by attempting to grow these plants in unsuitable soils. Some of the finest Rhododendrons we have seen were grown in yellow clay only, showing how accommodating the plants are where there is no lime, and we agree with the author that a good deal of nonsense has been written on what is, and what is not, suitable for these plants. The information on the propagation and cultivation is all that one would expect from such an authority, and is clear and to the point, so that anyone can understand it. In the illustrations we are glad to see such well-tried old friends as 'Sappho' and 'Fastuosum.' The book is full of instructive matter, well printed, and well indexed.

"The Herb Garden." By Frances A. Bardswell. With sixteen illustrations by the Hon. Florence Amherst and Isabelle Forrest. Sm. 4to., 173 pp. (A. C. Clarke, London, 1911.) 7s. 6d. net.

The authoress has written this book in quite a different style from that of any books on herbs that we have read before, and a very instructive and pleasing style it is. We hope it may be the means of bringing these plants into the favour they once enjoyed in this country. On the Continent herbs are in great demand for flavouring purposes, and the secret of many dainty dishes is the judicious use of herbs; but there is another side in which they are of great value, viz. medicinally. Mention is made in the Introduction of a famous doctor, then an invalid, taking chamomile-tea every evening, and his great faith in this old-fashioned remedy, and after more than forty years' use of this herb-tea whenever unwell we can testify to its great beneficial results. Many herbs that were well known for their healing or curative properties are now, unfortunately, seldom or never seen, although they had been proved through generations of our forefathers.

That the book is very comprehensive is shown by the chapter on the making of the herb-garden, tender and hardy annual and biennial herbs, herbs grown for their aromatic seeds, perennial kitchen herbs, gathering, drying, and storing wild herbs for physic, and many other chapters of lively interest. Excellent instruction is given on the best times to plant and to increase them.

“Carnations and Pinks.” By T. H. Cook, James Douglas, and J. F. McLeod. 8vo., 116 pp. (Jack, London, 1911.) 1s. 6d. net.

Although a great deal has been written on these plants, the reader will find plenty to interest him from the pen of three such talented growers as the authors, one of whom has recently passed away, but whose name will be associated for many years with carnations and pinks, the late James Douglas, V.M.H. All types of these plants are ably dealt with, from the humble pink to the gorgeous Malmaison, and even the delightful rock-garden pinks are not forgotten. Every phase of cultivation is gone into, from cross-breeding to all methods of propagation and cultivation. Pests and diseases and their remedies are carefully and fully gone into; in brief, a mass of sound information is crammed into the book from cover to cover. Printing and plates are excellent, and a good index finishes a good book.

“Lilies.” By A. Grove. 8vo., 116 pp. (Jack, London, 1911.) 1s. 6d. net.

This is a well-written book by one who has evidently thoroughly studied their different requirements and habits, and many, we hope, will, after reading the book, find that the difficulties of cultivation are by no means insuperable. In the preface Mr. H. J. Elwes, V.M.H., in one paragraph, touches one of the difficulties, in speaking of “those who are fortunate enough to live on soils free from lime.” Our experience is that few lilies like lime, but they do revel in a soil containing plenty of humus, but not rich in manure. A most useful appendix at the end of the book gives the name, place of origin, and remarks on each. The printing and plates are very good.

“Apples and Pears.” By George Bunyard, V.M.H. 8vo., 116 pp. (Jack, London, 1911.) 1s. 6d. net.

Mr. Bunyard's name is such a household word amongst fruit-growers that anything from his pen on the subject is certain of being carefully read, with benefit to the reader. And this book is so instructive and practical that all, even experts, may learn lessons from its pages. Only on one point do we disagree with the author, and that is the advocating that all apples and pears should be allowed a year's growth after planting before pruning. There has been much controversy in the horticultural Press on this subject, and the opinion of the majority of writers, and our own, is decidedly in favour of pruning the first year after planting. We have planted thousands of fruit trees, and found the practice so successful, that we feel sure it is correct so to prune. We would like to add emphasis to Mr. Bunyard's advice on summer pruning. He says, “Summer pruning is often done too early for appearances' sake; but this practice induces secondary growth, which is not desirable.” How true this is! Vast numbers of fruit trees are barren annually through summer pruning too early or injudiciously. The end of August or early in September is quite soon

enough in most seasons. Amongst the many chapters may be mentioned those on selection of varieties for both inside and out, gathering, storing, pests, and a number on profitable fruit-culture for market. The lists of varieties are not too long and confusing, and a good selection is given of the best exhibition varieties. The work is well and boldly printed, with excellent coloured plates and a capital index.

“Annual and Biennial Garden Plants.” By A. E. Speer, F.R.H.S. 8vo., 256 pp. (John Murray, London, 1911.) 7s. 6d. net.

The author has dealt with his subjects in a masterly manner, and the book will be valuable, not only for its practical matter, but also for indicating the proper pronunciation of the names. An accent is placed over the syllable that should be emphasized—for instance, “Gypsóphila, not Gypsophíla; also any discarded name is given, as well as the correct botanical name and the common name. The work is copiously illustrated, the print is excellent, the cultural information of a highly practical character, and the plants are all carefully arranged in alphabetical order. As hardy flowers are now so popular in every garden, this book will supply a long-felt want, and, we hope, be the means of these plants being as much grown as they deserve.

“The Practical Flower Garden.” By Helena Rutherford Ely. 8vo., 304 pp. (Macmillan, New York and London, 1911.) 8s. 6d. net.

This beautifully illustrated and well-printed book was written for American readers, and the illustrations are taken from the authoress's garden and a “Connecticut garden,” and are almost British in appearance. A good deal that is written would scarcely apply to gardening in this country, but very much might be done on the lines suggested; and we like specially the contents dealing with the raising of trees, &c., from seed and the chapter on “Wild Gardens.” Many other interesting topics to the gardener will be found in the book, which is well indexed.

“Histoire des Légumes.” By Georges Gibault. 8vo., 402 pp. (Librairie Horticole, Paris.) 5 fr.

Those who have read the interesting essays on the history of cultivated vegetables by M. Gibault which have appeared from time to time in various French journals, must have hoped that these sketches would in due time appear, enlarged and developed, in book form. That wish has now been fulfilled, and the work before us presents a mass of research and detailed information, and will, no doubt, for many years remain the standard authority on this subject.

In his wide knowledge of horticultural history the author stands second to none, and the judicious blend of literary charm and Gallic wit prevent any traces of the midnight oil from assaulting the reader's nostrils.

To read any section of this work is to be carried back through the Middle Ages to Rome and Greece in their prime, to Egypt, and to

those dim Asian countries whence so many of our well-known plants started their wanderings.

Let us take, for instance, the lettuce. Spoken of by Herodotus as being present at the feasts of the Persian kings, 550 B.C., we find it later closely associated with Adonis, who in his Syrian form typified the fugitive herb which blooms and dies away. In Greece this memory was kept alive at the celebration of his death by sowing lettuce seeds in small jars, and finally casting these "Adonis gardens" into the water. Seeds have been found in Egyptian tombs, and it is considered to have been one of the bitter herbs at the Paschal feasts of the Hebrews. Then we find it at Roman tables, and as the origin of the family name of the Latucini.

The Moors in Spain in the thirteenth century gave it an honoured place in their gardens, and a leap of centuries shows us the sturdy Rabelais collecting seeds at Rome for the garden of his friend the Bishop of Mallezais. The good cleric doubtless accepted as pontifical any gastronomical recommendations from such a source!

The white-seeded form owed its introduction in France to Charles I., although in an indirect manner. This variety was brought to Avignon during the Papal residences, and from thence it found an easy route to Paris, and later was brought to this country by Tradescant. This example will show how closely bound up with human history are the migrations of various vegetables.

We miss, by the way, in the account of this plant, the amusing story related by Athenaeus of Aristoxenus. So great was the love of the latter for this vegetable that he watered at night with mead such plants as were to appear at the next day's feast. Certain supposed medical effects alluded to by the same writer are omitted, we presume from motives of discretion.

The strawberry is included on account of its close association with the "Jardin Potager," and an excellent account of the very interesting history of this fruit is given. To the accounts given of early references might be added a letter patent given by Charles VI. granting the fruit-sellers of Paris exemption from octroi duties on "fraiz, pommes, poires," &c. This evidence, to be found in "Le Livre des Métiers," shows the fruit was appreciated at this time, and it may quite possibly have been cultivated for this market.

The limitations of space forbid an examination of further sections, and we venture in conclusion to prophesy that the "Histoire des Légumes" will take its place by the side of De Candolle's great work and Hehn's "Wanderings of Plants and Animals" on the shelves of students of horticultural history.

Of the production of the book we may say it is far better in paper and typography than is usually the case in French productions of kindred nature. It is divided into rough sections, such as "Légumes proprement dit," "Légumes Racines," &c., and is prefaced by what we believe it is now correct to call a "foreword" by M. Philippe L. de Vilморin. It contains a few reproductions of illustrations from old herbals.

DONORS OF SEEDS, PLANTS, TREES, &c., TO THE SOCIETY'S
LABORATORY AND GARDEN AT WISLEY DURING THE YEAR 1911.

- ADAMS, F., Tunbridge Wells. Delphiniums. Growing on.
 ALLNUTT, Messrs., Woking. Begonias. See p. 558.
 BACON, J. G., Nottingham. Insecticide.
 BAKER, H. C., Almondsbury. Seed of *Gentiana Kurroo*. Plants raised.
 BAKER-CRESSWELL, G. G., Alnwick. Seeds of *Pentstemon heterophyllus* for distribution, and *Meconopsis Wallichii* to be sown.
 BARBIER, Messrs., Orleans. Roses and flowering trees. Planted in garden.
 BARNETT, W., Swindon. Melon and tomato seed. See p. 427.
 BARR, Messrs., Covent Garden. Broccoli; cucumbers (see p. 399); seeds from Chile (growing on); seeds from Sikkim (growing on); *Statice Perezii* (growing on); Savoyas (see p. 576); seeds from India (not yet germinated); *Watsonias* (growing on).
 BARTHOLOMEW, A. C., Reading. Seeds (plants raised for distribution); bulbs of *Iris histrioides* (planted in garden); rock plants (planted on rockery).
 BASKETT, Rev. C. R., Dorchester. Seeds of unknown plant (identified as *Papaver Rhoeas umbrosum*); double celandine. Planted in garden.
 BECKETT, E., V.M.H., Elstree. Cucumber (see p. 399); Cape Pelargoniums. Growing on.
 BEHRENS, Mrs., Marazion. Cuttings of *Mesembryanthemum* (growing on); collection of seeds (plants raised).
 BELL & BIERERSTEDT, Messrs., Leith. Peas (see p. 403); candytuft (see p. 558).
 BENNETT-POE, J. T., V.M.H., 29 Ashley Place, S.W. Daffodil bulbs. Planted in garden.
 BILNEY, W. A., J.P., Weybridge. Alpines. Planted on rockery.
 BOND, Rev. C. G. O., Farnham. *Salvia Grahami*. Growing on.
 BOWKER, A., Shawford. *Cycas revoluta*. Failed to grow.
 BOWLES, E. A., M.A., F.L.S., Waltham Cross. Alpines. Planted on rockery.
 BOX, J., Lindfield. Delphiniums and Trollius. Growing on.
 BRASSEY, Hon. Mrs., Heythrop. *Parochetus communis*. Planted on rockery.
 BRENNAN, Miss, Ballymasculan. Cape Pelargoniums. Growing on.
 BREWER, G. W. S. Book for Library.
 BRODIE OF BRODIE, I., Forres. Gladiolus corms. Growing on.
 BROOMAN-WHITE, R., Garelochhead. Orchids. Added to collection.
 BROWN, Col. W. H., Piccadilly. Seeds from Africa. Growing on.
 BUNBURY, Sir H., Bt., Mildenhall. Seeds of *Ononis rotundifolia*. Plants raised for distribution.
 BUNYARD, Messrs., Maidstone. Delphiniums. Growing on.
 CAMBRIDGE BOTANIC GARDEN. Collection of seeds (plants raised for distribution); rock plants (planted on rockery).
 CAMPBELL, J. A., Lochgilphead. *Rhododendron Rollisoni*. Planted in garden.
 CANADIAN EXHIBITION COMMISSIONER. Book for Library.
 CARRINGTON, Miss, Ryde. Tubers of *Apios tuberosa*. Planted in garden.
 CARTE, Lady DOROTHY D'OYLY, Wilton Crescent, S.W. Bulbs of South African swamp lilies.
 CARTER, Messrs., Raynes Park. Carrots (see p. 564); cucumbers (see p. 399); peas (see p. 403).
 CHAPLIN, M. D., Regent's Park. Seeds of *Leucadendron argenteum*. Growing on.
 CHARINGTON, Mrs., Hever. Seeds from the Zambesi district. Plants raised and growing on.
 CHARLTON, Messrs., Tunbridge Wells. Delphiniums. Growing on.
 CHELSKA PHYSIC GARDEN. Collection of seeds. Plants raised for distribution.
 COOKE, Dr. Books for Library and specimens for Herbarium.
 COUSENS, P. H., Swanwick. Raspberries. Growing on.
 CRACOW BOTANIC GARDEN. Collection of seeds. Plants raised for distribution.
 CRISP, Sir FRANK, J.P., F.L.S., Henley-on-Thames. Collection of rock plants for the rockery.
 CROCKER, E. F., Bristol. Broccoli.
 CROOK, J., Camberley. Polyanthus seed. Growing on.
 CUTHBERT, Mrs., Hexham. Seeds of *Grindelia lanata*. Not yet germinated.
 DAVIDSON, Miss, Horsham. Cape Pelargoniums. Growing on.
 DAVIES, T. M., Russell Square. Collection of seeds. Not yet germinated.

- DEAL, W., Kelvedon. Beans (see p. 425); caudytuft (see p. 558).
 DE COURCY, F. A., South Africa. Seeds from Zululand. Sown.
 DELMARD, A., Bulgaria. Collection of seeds. Plants raised.
 DEW, A. A., Coalville. Potato 'Dew's Favourite.' See p. 570.
 DICKSON, BROWN & TAIT, Messrs., Manchester. Cucumbers. See p. 399.
 DICKSON & ROBINSON, Messrs., Manchester. Carrots (see p. 564); peas (see p. 403); dahlias. Growing on.
 DIMMOCK, A., Kingsway. Gladiolus corms. Planted in garden.
 DIPNALL, T. H., Hadleigh. *Primula vulgaris* fl. pl. Planted in garden.
 DIXON, C., Kensington. Seeds of *Koeleruteria paniculata*. Not yet germinated.
 DOBBIE, Messrs., Edinburgh. Collection of sweet peas (see p. 394); cabbages (see p. 426); carrots (see p. 564); cucumbers (see p. 399); potatoes (see p. 569).
 DON, J., Ollerton. Vine. Growing on in viney.
 DORRIEN-SMITH, Miss C. F., Scilly. Cape Pelargoniums. Growing on.
 DREER, H. A., Philadelphia. Seeds of annuals. See p. 556.
 DURANT-PARKER, O., Totnes. Seeds of *Quercus Suber*. Plants raised.
 DURHAM, F. R., Salcombe. Seeds of *Senecio rotundifolia*. Not yet germinated.
 EARP, W., Lamberhurst. Melons. See p. 427.
 EDINBURGH BOTANIC GARDEN. Collection of seeds. Plants raised for distribution.
 EWBANK, Miss W., Ryde. Collection of seeds. Plants raised. Growing on.
 FABUS, A. A., Ensworth. *Adiantum* 'Glory of Moordrecht.' Growing on.
 FERGUSON, G., Kendal. Collection of stove plants (growing on); tubers of *Achimenes* (growing on); melon seed (to be sown).
 FIELDER, R., Hatfield. *Oenothera Arendsii*. Growing on.
 FORBES, Messrs., Hawick. Delphiniums. Growing on.
 FOWLER, J. G., J.P., South Woodford. *Cypripedium Tecanum* *Clinkaberry-anum*. Added to collection.
 FRY, Rev. S. C., Girvan. Potato 'Prime Minister.' See p. 573.
 GERAHY, C. E., Woking. Seeds of *Ceanothus thrysiflorus*. Not yet germinated.
 GODSEFF, J., St. Albans. Pea 'Godseff's Delicious.' See p. 411.
 GODWIN, AUSTEN, Mrs., Godalming. *Viola* 'Red Velvet, Nore Variety.' Growing on.
 GORE-BOOTH, Sir J., Bt., Lissadell. *Primula* 'Lissadell hybrid.' See p. 560.
 GOULD, A. R., West Africa. Collection of seeds. Sown.
 GRAHAM, Mrs., Grasmere. Collection of seeds. Sown.
 GRANT DALTON, Mrs., Sway. *Pinguicula*. Planted in garden.
 GRAY, Z., Sandy. Carrot 'Golden Tankard.' See p. 566.
 GRIMES, J., Cardiff. *Geranium pratense* var. Planted in garden.
 GÜSSOW, H. T., Ottawa. Collection of seeds. Plants raised and growing on.
 HAARER, A. E., Wandsworth Common. *Auriculas*. Planted in garden.
 HANBURY, Lady, Ventimiglia, Italy. Collection of seeds. Plants raised for distribution.
 HANCOCK, T., Mansfield. Tomatos (see p. 428); peas (see p. 403).
 HARKNESS Messrs., Bedale. *Chrysanthemums*. Added to collection.
 HARVEY, Sir R., Bt., Slough. Seeds of lotus lily. Failed to germinate.
 HAWKER, A. E., London, E.C. 'Corvusine.' See p. 580.
 HAYDON, Rev. G. P., Westbere. Daffodil bulbs. Planted in garden.
 HENDERSON, Sir GEORGE, Otford. Seeds of *Pinus Gerardiana* and *Capparis spinosa*. Plants raised.
 HENSLOW, Rev. Prof., Leamington. Wallflower seeds. Plants raised and growing on.
 HIBBERD, Messrs., Botley. Strawberry 'George V.' Growing on.
 HOBBISS, Messrs., Dereham. Delphinium. Growing on.
 HOLMES, W. G., Tain. Peas (see p. 403); potatoes (see p. 569); cabbages (see p. 425).
 HUDSON, Miss F. M., Marple Bridge. Herbarium.
 HUDSON, J., V.M.H., Acton. Rose 'Juliet' (growing on); Dutch honeysuckle (see p. 559); *Nymphæa* 'James Brydon' (planted in garden).
 HUDSON, W., Surbiton Hill. Spores of *Osmunda regalis cristata*. Growing on.
 INDIA, AGRICULTURAL AND HORTICULTURAL SOCIETY OF, Calcutta. Seeds of *Hibiscus*. Plants raised and growing on.
 JACKSON, S., Shrewsbury. Bean 'Prince of Pengwern.' See p. 425.
 JEKYLL, Miss G., V.M.H., Godalming. Collection of *Viola* seeds. Plants raised.

- JEYES' SANITARY COMPOUNDS Co., Cannon Street, London. "Jeyes' Fluid Cylin."
- KELWAY, Messrs., Langport. Delphiniums. Growing on.
- KENT & BRYDON, Messrs., Darlington. Potato. See p. 569.
- KEW, ROYAL BOTANIC GARDENS. Collection of seeds. Plants raised for distribution.
- KEYNES, WILLIAMS & Co., Messrs., Salisbury. Cucumbers. See p. 399.
- KINGSMILL, A., Harrow Weald. *Maianthemum bifolium* var. *dilatatum*. Planted in garden.
- KRUMBHOLZ, E., Clapham. *Calceolaria polyrhiza*. Planted on rockery.
- LANE, Messrs., London, S.E. Patent ribbon wire and metallic labels. See p. 580.
- LAWRIE, P., Kirknewton. Potato 'Hatton Beauty.' See p. 569.
- LAWRENCE, Sir TREVOR, K.C.V.O., V.M.H., Dorking. *Crossandra undulacifolia*; white *Primula obconica*, growing on; collection of orchids and Anthuriums; *Crinum* (growing on).
- LAXTON, Messrs., Bedford. Raspberries. Added to collection.
- LEDGER, W. E., Wimbledon. Cuttings of *Pelargonium triste* var. *filipendulifolium*. Growing on.
- LE LACHEUR & SHERRIS, Misses, Henfield. Melons. See p. 427.
- LIEB, W., Krefeld. Collection of Acalyphas. Growing on.
- LINDSAY, R., Murrayfield. Rock plants. Planted on rockery.
- LITTLE, Miss D., Riviera Levante, Italy. Plants for the rockery. Growing on.
- LITTLEWOOD, Mrs., Cheltenham. Collection of seeds. Plants raised.
- LOCKE-KING, H. F., Weybridge. Douglas spruce. Planted in Pinetum.
- LONGSTAFF, Mrs., Wimbledon. Seeds from Rhodesia. Sown.
- LOW, Messrs., Enfield. Lowberry and Phenomenal Berry (growing on); Himalayan Giant Berry (growing on).
- LYONS, BOTANIC GARDEN, France. Collection of seeds. Plants raised for distribution.
- MACK & MILN, Messrs., Darlington. Pea 'Chatsworth.' See p. 403.
- MACKELVIE, D., Lamlash. Potatoes 'Arran Chief' and 'Arran Treasure.' See p. 569.
- McKENZIE, Messrs., Dublin. Potato (see p. 469); Savoy (see p. 576).
- MACKINLAY, G., Amptill. Cabbage 'MacKinlay's Matchless.' Growing on.
- MAGOR, E. J. P., St. Tudy, R.S.O., Cornwall. *Rhododendron* seedlings from R. 'Mrs. Butler,' *Rhododendron yunnanense*, *Rhododendron punctatum*. All growing on.
- MAHY, ELIE, Reading. Circular Troughs. See p. 580.
- MANSSELL & HATCHER, Messrs., Rawdon. Orchids (added to collection); lily bulbs (planted in garden).
- MARSHALL, W., V.M.H., Bexley. Collection of hardy ferns. Planted on rockery.
- MARTINEAU, Mrs., Twyford. Vine. Growing on.
- MARYON-WILSON, Miss, Blackheath. Seeds. A few plants raised. *Physianthus albens*. Failed.
- METCALFE, W. P., Oxted. Seeds of *Primula stellata*. Plants raised and growing on.
- MITCHELSON, A., Womersley. Melon (see p. 427); tomato (see p. 428).
- MOORE, F. W., Bedford. Potato. See p. 469.
- MORTIMER, S., Farnham. Cucumbers. See p. 399.
- MORTON, W. H., Gloucester. Peas (see p. 403); potato (see p. 469).
- NASH, Messrs., Wimbledon. Delphiniums. Growing on.
- NEWBERRY, T., Hucknall. Bean 'Lady Byron.' See p. 425.
- NICHOLLS, Mrs., Bridgend. *Primula rosea*. Planted in garden.
- NORMAN, Capt. MONTAGU C., D.S.O., Campden Hill, W. A large collection of seeds collected by E. H. Wilson in China. Many plants raised and growing on.
- NORTH-ROW, W., Gower Street, W.C. Seeds from Norway. Sown.
- NUTTING, Messrs., London, S.E. Cabbages; carrots (see p. 564); Savoy (see p. 569).
- PARK, Messrs., Wigan. Patent 'Dreadnought' tools.
- PEARSON, Miss S., Earl's Colne. Seed of *Clematis* sp. To be sown.
- PENNICK, Messrs., Delgany. *Escallonia organensis*. Planted in garden.
- PERMANENT PRINTING AND PROCESS Co., Holborn. 'Ivo' labels; tree labels (see p. 580).
- PERRY, J., Worcester Park. Potatoes. See p. 469.

- PETERS, W., Leatherhead. Apple 'Harry Pring.' Two trees added to collection.
- POTTEN, E., Cranbrook. Pelargonium 'Double Paul Crampel.' Growing on.
- PULHAM, H. C., Elsenham. Dianthus for the rockery.
- RICHARDSON, Miss, Crown Hill, R.S.O., Devon. Collection of seeds from Buenos Ayres. Plants raised.
- ROBERTS, R., Lowestoft. Potato 'Robustus.' See p. 571.
- ROGERS, Connamder, Falmouth. Seed of *Sophora tetraptera*. To be raised.
- ROGERS, R. B., Launceston. Seeds from Alaska. Plants raised.
- RUTTER, Messrs., Wisbech. Potatos. See p. 569.
- RUXTON, A. F., Ashstead. Seed of *Linaria alpina* (plants raised); plants of *Echium rubrum* and *Laurus Persea* (planted in garden); seed of *Berberis Thunbergii* (not yet germinated).
- RUYS, B., Holland. Delphiniums. Growing on.
- SALOMONS, L., Dorking. Melons.
- SALVIN, B. H., Rochester, U.S.A. Seeds of *Viola*. Plants raised and growing on.
- SANDER, Messrs., St. Albans. Orchids. Added to collection. Marguerite 'Mrs. F. Sander.' Growing on.
- SANDS, W. E., Hillsborough, Ireland. Potatos. See p. 575.
- SCRASE-DICKINS, C. R., Horsham. Gladiolus corms. Growing on.
- SEATON, H. E., Port Moody, British Columbia. Seed of *Gentiana* sp. Sown in wild garden by pond side.
- SHARPE, Messrs., Sleaford. Peas. See p. 403.
- SHIRLEY, Rev. W., Bursledon. Seeds of *Malvastrum lateritium*. To be sown.
- SHOESMITH, H., Woking. Dahlias. Growing on.
- SMITH, Messrs. F. E., Belfast. Dahlias. Growing on.
- SMITH, F. W., Weybridge. Marrow. See p. 427.
- SMITH, Messrs. W., Aberdeen. Potato 'Arduthie Early.' See p. 570.
- SOLOMON, J., London, W. Peas. To be grown in 1912.
- SUTTON, Messrs., Reading. Carrots (see p. 564); cucumbers (see p. 339); peas (see p. 403); Savoys (see p. 576).
- SYDENHAM, Messrs., Birmingham. Carrots (see p. 564); cucumbers (see p. 399); peas (see p. 403); potatos (see p. 569); asters (see p. 556); mignonette (see p. 559); Watsonias (growing on).
- TAYLOR, J., Shrewsbury. Turnip 'Taylor's Cream.' See p. 428.
- TAYLOR, Mrs., Henley-on-Thames. Seed of *Chimonanthus fragrans*. Plants raised and growing on.
- TOOGOOD, Messrs., Southampton. Cucumbers (see p. 399); carrots (see p. 564); Savoys (see p. 576); potatos (see p. 569); cauliflower (see p. 426).
- TROYTE-BULLOCK, Miss, Yeovil. Cape pelargoniums. Growing on.
- TULLY NURSERIES, Kildare, Ireland. Alpines. Planted on rockery.
- TURNER, C., Muswell Hill. 'Slug Killer.' See p. 580.
- TURNER, C., Slough. Pampas grass. Planted in garden.
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- VEITCH, Messrs. R., Exeter. Carrots (see p. 564); cucumber (see p. 399); peas (see p. 403); Savoys (see p. 576); potatos (see p. 569); radishes (see p. 427); aubergines.
- VELEY, Mrs., New Oxted. Australian fern.
- VERNER, Miss, Bournemouth. Cuttings of *Salvia* (rooted, but afterwards failed); seed of *Ageratum* (plants raised).
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- WALKER, E., Putney. *Arabis alpina variegata*. Planted on rockery.
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- WATSON, J., Grantham. Rhubarb. Growing on.
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- WHEELER, Messrs., London, S.E. Cabbages (see p. 425); carrots (see p. 564); Savoys (see p. 576).
- WHITE, F. B., Bursledon. Pea 'Queen May.' See p. 418.
- WHITE, J. G., Strathspey. Begonia. See p. 558.
- WHITELEGG & PAGE, Messrs., Chislehurst. Aster (see p. 556); 'Newberry' (growing on).
- WILKS, Rev. W., M.A., Croydon. Cuttings of vines. Failed to root. Bulbs of *Zephyranthes carinata* (growing on); flower seeds (plants raised).
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- WOOD, Rev. H., New York. Seeds of musk melon. To be grown on in 1912.
- YATES, S., Manchester. Peas. See p. 403.
- YOUNG, Messrs., Cheltenham. Carnations. Growing on.
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- *The fruit growers' guide*. 3 vols. London, n.d. 4to. (3)
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NOTES ON RECENT RESEARCH
AND
SHORT ABSTRACTS FROM CURRENT PERIODICAL
LITERATURE, BRITISH AND FOREIGN,
AFFECTING
HORTICULTURE & HORTICULTURAL SCIENCE.

JUDGING by the number of appreciative letters received, the endeavour commenced in volume xxvi. to enlarge the usefulness of the Society's Journal, by giving an abstract of current Horticultural periodical literature, has met with success. It has certainly entailed vastly more labour than was anticipated, and should therefore make the Fellows' thanks to those who have helped in the work all the more hearty.

There are still, we feel, some departments of Horticulture and Horticultural Science very imperfectly represented in these abstracts, and the Editor would be grateful if any who have time at command, and who are willing to help in any special direction in this work, would communicate with him. He desires to express his most grateful thanks to all who co-operate in the work, and he ventures to express the hope that they will all strictly adhere to the general order and scheme of working, as the observance of an identical *order* can alone enable the Editor to continue to cope with the work. The order agreed on is as follows:—

1. To place first the name of the plant, disease, pest, &c., being noticed; and in this, the prominent governing or index word should always have precedence.

2. To place next the name, when given, of the author of the original article.

3. Then, the abbreviated form of the name of the journal, &c., in which the original article appears, taking care to use the abbreviation which will be found on pp. 281, 282.

4. After this, a reference to the number, date, and page of the journal in question.

5. If an illustration be given, to note the fact next, as "fig.," "tab.," or "plate."

6. After these preliminary necessities for making reference to the original possible for the reader, the abstract or digest should follow, ending up with the initials of the contributor affixed at the close of each Abstract or Note.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP
IN THIS WORK.

Baker, F. J., A.R.C.S., F.R.H.S.
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 Swire, W., F.R.H.S.
 Veitch, Harry J., F.L.S., F.Z.S., F.R.H.S.
 Voss, W. A., F.C.S., F.R.H.S.
 Webster, A. D., F.R.H.S.
 Welby, F. A., F.R.H.S.
 Williams, S. E., F.R.H.S.
 Wilson, Gurney, F.L.S., F.R.H.S.

JOURNALS, BULLETINS, AND REPORTS

from which Abstracts are made, with the abbreviations used
for their titles.

Journals, &c.	Abbreviated title.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
Annales Agronomiques	Ann. Ag.
Annales de la Soc. d'Hort. et d'Hist. Naturelle de l'Hérault	Ann. Soc. Hé.
Annales de la Soc. Nantaise des Amis de l'Hort.	Ann. Soc. Nant. des Amis Hort.
Annales des Sciences Naturelles	Ann. Sc. Nat.
Annales du Jard. Bot. de Buitenzorg	Ann. Jard. Bot. Buit.
Annals of Botany	Ann. Bot.
Beiheft zum Botanischen Centralblatt	Beih. Bot. Cent.
Boletim da Real Sociedade Nacional de Horticultura	Bol. R. Soc. Nac. Hort.
Boletim da Sociedade Broteriana	Bol. Soc. Brot.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Bulletin de la Société Botanique de France	Bull. Soc. Bot. Fr.
Bulletin de la Soc. Hort. de Loiret	Bull. Soc. Hort. Loiret.
Bulletin de la Soc. Mycologique de France	Bull. Soc. Myc. Fr.
Bulletin Department of Agricult. Brisbane	Bull. Dep. Agr. Bris.
Bulletin Department of Agricult. Melbourne	Bull. Dep. Agr. Melb.
Bulletin of the Botanical Department, Jamaica	Bull. Bot. Dep. Jam.
Bulletin of Bot. Dep. Trinidad	Bull. Bot. Dep. Trin.
Bulletino della R. Società Toscana d'Orticoltura	Bull. R. Soc. Tosc. Ort.
Canadian Reports, Guelph and Ontario Stations	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chronique Orchidéeenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Contributions from U.S.A. Herbarium	Contr. fr. U.S.A. Herb.
Department of Agriculture, Victoria	Dep. Agr. Vict.
Department of Agriculture Reports, New Zealand	Dep. Agr. N.Z.
Dictionnaire Iconographique des Orchidées	Dict. Icon. Orch.
Die Gartenwelt	Die Gart.
Engler's Botanische Jahrbücher	Eng. Bot. Jah.
Gardeners' Chronicle	Gard. Chron.
Gardeners' Magazine	Gard. Mag.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agricult. Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies	Jour. Imp. Dep. Agr. W.I.
Journal of Agricultural Science	Jour. Agr. Sci.
Journal of Botany	Jour. Bot.
Journal of Chemical Society	Jour. Chem. Soc.
Journal of Economic Biology	Jour. Econ. Biol.
Journal of Economic Entomology	Jour. Econ. Entom.
Journal of Genetics	Jour. Gen.
Journal of Horticulture	Jour. Hort.
Journal of the Board of Agriculture	Jour. Bd. Agr.
Journal of the Linnean Society	Jour. Linn. Soc.
Journal of the Royal Agricultural Society	Jour. R.A.S.
Journal S.E. Agricultural College, Wye	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte	Kais. Ges.
La Pomologie Française	Pom. Franç.
Le Jardin	Le Jard.
Lebensgeschichte der Blütenpflanzen Mitteleuropas	Lebens. d. Blütenpfl.
Mendel Journal	Mendel Jour.
Naturwiss. Zeitschrift Land und Forst	Nat. Zeit. Land-Forst.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin	Not. König. Bot. Berlin.
Oesterreichische Garten-Zeitung	Oester. Gart. Zeit.

Journals, &c.	Abbreviated
Orchid Review	Orch. Rev.
Orchis	Orchis.
Phytopathology	Phytopathology.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Quarterly Journal of Forestry	Quart. Jour. of Forestry.
Queensland Agricultural Journal	Qu. Agr. Journ.
Reports of the Missouri Botanical Garden	Rep. Miss. Bot. Gard.
Revue de l'Horticulture Belge	Rev. Hort. Belge.
Revue générale de Botanique	Rev. gén. Bot.
Revue Horticole	Rev. Hort.
The Garden	Garden.
Transactions Bot. Soc. Edinburgh	Trans. Bot. Soc. Edin.
Transactions of the British Mycological Soc.	Trans. Brit. Myc. Soc.
Transactions of the Massachusetts Hort. Soc.	Trans. Mass. Hort. Soc.
Transactions Royal Scot. Arboricultural Soc.	Trans. Roy. Scott. Arbor. Soc.
U.S.A. Department of Agriculture, Bulletins	U.S.A. Dep. Agr.*
U.S.A. Experimental Station Reports	U.S.A. Exp. Stn.†
U.S.A. Horticultural Societies' publications	U.S.A. Hort. Soc.†
U.S.A. State Boards of Agriculture and Horticulture	U.S.A. St. Bd.†
Woburn Experiment Farm Report	Woburn.

* The divisions in which the U.S.A. Government publish Bulletins will be added when necessary.

† The name of the Station or State will in each case be added in full or in its abbreviated form.

NOTES AND ABSTRACTS.

Alkali Lands, The Reclamation of Seeped and. By C. F. Brown and R. A. Hart (*U.S.A. Exp. Sin., Utah, Bull.* 111; Dec. 1910; 5 figs., 2 plates).—Large tracts of land in Utah and Western Colorado which at one time yielded good crops are now worthless so far as production is concerned, the surface being often covered with deposits of alkali and so soft in places that men and animals cannot cross it, and it is easy to push a two-inch auger fifteen feet into the ground (p. 80). This state of things has been mainly brought about by the loss of water from the supply canals constructed for irrigation purposes, the soil becoming first water-logged and then incrustated with the alkali as the result of evaporation. This bulletin describes the carrying out of an experiment between 1906 and 1910 in the reclamation of a farm of forty acres which was in such a bad state that it was generally regarded as irreclaimable. The method adopted was drainage followed by liberal irrigation and vigorous cultivation, and during this period it was estimated that three thousand tons of harmful salts were removed. As a result, three-fourths of the area was productive by the end of the period dealt with, and much of the remainder was also giving returns (p. 86).—*A. P.*

Amara avida (Say) as a Strawberry Pest. By J. B. Smith, Sc.D. (*Jour. Econ. Entom.*, vol. iii., pt. i.; pp. 97-99; Feb. 1910; figs.).—This ground beetle has not previously been recorded as a pest of strawberries, but in 1909 it proved very destructive in New Jersey, eating the fruits ("seeds") of the strawberries, and in doing so damaging the flesh so as to render them unsaleable. Several allied species are well known strawberry pests, but in the present case the author considers the trouble was due, in the main, to the destruction of the normal food of the insect by ploughing-in rough grass land just before the ripening of the fruit.—*F. J. C.*

Androcymbium melanthioides. By W. I. (*Gard.*, Jan. 28, 1911, p. 41; fig.).—This rare member of the Lily family, which is native through central Cape Colony, Natal, Transvaal, and Rhodesia to Nyasaland, was in cultivation in 1823, but has since been lost, until its recent introduction by Mr. W. E. Gumbleton. Large bracts form the attractive feature of the plant; the bulb is like that of a very small tulip, from which a slender stem is developed. The lower leaves are long and narrow, the upper decreasing in length. At the top of the stem are several broad bracts, the upper ones quite white, with green veins, sometimes $3\frac{1}{2}$ inches long by 2 inches wide. These form an involucre for the bunches of small flowers which

are produced in the axils. The plant is not hardy, but requires cool greenhouse treatment. The bulbs should be well ripened off after growth ceases, and water withheld until they again begin to grow.

H. R. D.

Anthocyanin, on the formation of. By M. Wheldale (*Jour. Gen.*, i. 2; pp. 133-158; May 1911).—The authoress believes, and gives evidence for her belief, that the formation of anthocyanin from a chromogen depends upon two processes in which at least two different enzymes are involved. The local appearance of pigment depends in anthocyanic plants upon local variation in the concentration of sugars and glucosides in the tissues. The bearing of the question upon Mendelian factors is considered.—*F. J. C.*

Aphelinus diaspidis, Howard. By H. J. Quayle (*Jour. Econ. Entom.*, iii., pt. 3, pp. 398-401; Oct. 1910).—This parasite of the orange scale (*Chrysomphalus aurantii*, Mask.), while not destroying large numbers of the insects on which it preys, is by far the commonest parasite of its host. It is described and its life-history detailed. The orange scale is a pest of Citrus trees in America.—*F. J. C.*

Aphididae of Illinois, List and Notes on. By J. J. Davis (*Jour. Econ. Entom.*, iii. 5; pp. 407-420; plates).—A list with host plants and descriptions of some of the species.—*F. J. C.*

Aphididae, Plant-louse Notes. By C. P. Gillette (*Jour. Econ. Entom.*, iii. 5; pp. 403-407; Oct. 1910).—Contains notes with sketches of antennæ of a number of aphides found in various parts of the United States.—*F. J. C.*

Apple-growing in New England: Orchard Management. By C. D. Jarvis (*U.S.A. Exp. Stn., Conn., Bull.* 66; March 1911; 35 figs.).—This bulletin is intended rather for the general farmer than for the specialized apple-grower. The writer considers that the apple orchard of five or ten acres, when regarded as a component part of the farm system and properly cared for accordingly, is the ideal condition, and that fruit can be produced much cheaper if certain other crops are grown, or if some kind of live-stock is kept, so that labour, teams, and tools can be utilized to better advantage throughout the year.—*A. P.*

Apple-growing in New England: Planting. By C. D. Jarvis (*U.S.A. Exp. Stn., Conn., Bull.* 62; Feb. 1910; 27 figs.).—Many stock-raisers, dairymen, and general farmers in the Eastern States are finding their respective lines of business less profitable than formerly, and in looking around for a more remunerative line of endeavour have decided upon fruit-growing. This bulletin is intended for such, many of whom are unfamiliar with the first principles of fruit-growing. For raising trees the usual practice is to graft, or bud, seedlings that have been raised from the pomace from the cider press. It is recom-

mended to dig the seedlings in the fall and heel them in till about December, when they may be taken in for grafting, each individual being either grafted at the crown, or the root is cut up into three or four pieces and each one grafted, after which the grafts are packed in sand or moss and stored in a cool cellar till the spring, when they are planted out in the nursery row (p. 103). Some kinds are stated to thrive much better if double-worked, Northern Spy being often chosen for the intermediate stock. Tompkins King is one of those recommended for this increased attention. The dwarf tree in the English sense does not appear to find favour in the States, and the writer holds that for the commercial grower it has proved entirely unsatisfactory (p. 104). The low-headed standard, in which the head starts at about two feet from the ground in the case of most varieties, is the form usually preferred. Baldwin and Rhode Island Greening are pre-eminently the leading varieties of New England, but Northern Spy is specially recommended for planting at altitudes above 1,000 feet. Trees which have their roots well cut back are held to thrive just as well as those with elaborate root systems more or less intact, thus confirming the results at Woburn. As fibrous roots on a young tree are of little value when transplanting, the vitality of the tree depending more upon the energy stored up in its stem than upon its root development, trees with small root systems are to be preferred, as they are more expeditiously planted (p. 126).—A. P.

Apple-growing in New England: the Industry and Orchard Renovation. By C. D. Jarvis (*U.S.A. Exp. Stn., Conn., Bull.* 61; Jan. 1910; 29 figs.).—The apple crop of the United States has been diminishing during recent years, while there has been an increased demand for it not only from England, but from the continent of Europe. This, combined with the higher prices now obtainable, should make apple-growing a profitable investment, and his favourable position should give the New England grower a decided advantage over his western rivals (pp. 72 and 73). Neglected orchards are very common in these States, but many are now being taken in hand and, by pruning, cleaning, beheading and grafting, brought into good bearing condition, one orchard, the trees in which were seriously infested with scale and were making practically no growth, having produced an average of nine bushels to the tree four years after renovation.—A. P.

Apple in Pennsylvania, The: Varieties, Planting, and General Care. By J. P. Stewart (*U.S.A. Exp. Stn., Penn., Bull.* 106; Dec. 1910; 3 figs.).—In planting trees it is recommended to place the sides with the heavier roots towards the prevailing winds, and in forming the heads to adopt the dichotomous system on a tripod base (p. 10). The minimum of pruning is advocated, such as is necessary being done by pinching and training in early summer rather than by cutting out branches in the dormant season.—A. P.

Apple-Leaf hopper. By F. L. Washburn (*U.S.A. Exp. Stn., Minnesota, 17th Ann. Rept.* 1909; pp. 145-164; plates).—A careful account of the apple-leaf hopper (*Empoasca mali* Le B. = *Typhlocyba photophila* Berg.) is given. The young appear on apple trees soon after the leaf buds burst, and reach maturity about forty days later, there being two, and possibly three, broods during the year. The adult, which is green (the younger stages of the nymphs being white), measures about $\frac{1}{2}$ inch in length. The summer eggs are laid in the petioles of clover, apple, and probably other food plants, the winter eggs being placed in blister-like swellings on the bark of apple trees. The insect occurs on many other plants besides apple, including plum, maple, oak, black oak, thorn apple, basswood, hazel, box elder, choke cherry, sumac, European birch, cut-leaf birch, syringa, snowball, raspberry, blackberry, bush beans, corn, clover, lucerne, sugar beet, buckwheat, dahlia, hemp, rhubarb, potato, and grasses. Nursery stock suffers most from its attacks, and the best results have been obtained by carrying a canvas screen smeared with "tangle-foot" through the plantation, to catch the adult insects upon. The leaves when badly attacked curl as though attacked by the leaf-curling aphis, but when this has not occurred to a serious extent a spray made by dissolving 1 lb. fish oil soap in 10 gallons of water may be used with advantage. A record of experiments designed against the pest is given.

F. J. C.

Apple Orchard, Spraying an Essential Part of. By R. A. Emerson, R. F. Howard, and V. V. Westgate (*U.S.A. Exp. Stn., Nebraska, Bull.* 119; March 1911; 8 figs.).—During the last five years demonstrations have been made in twenty-two orchards distributed over the eastern part of this State, one of the objects being to determine whether apple insects and diseases could be controlled profitably. The difference in the annual value of the crops from the sprayed and the unsprayed trees averaged \$1.54 per tree, the cost being estimated at \$0.24 per tree. On the basis of fifty trees to the acre the average net gain from spraying worked out at \$64.55 from each acre per annum (p. 9). It is suggested that for the spraying of small orchards, such as those attached to farm homesteads, spraying outfits should be run on the same plan as threshing machines, a man buying a power sprayer and letting it out to his neighbours, in which way the machine would not only pay for itself, but reduce to a minimum the possibility of infection to his own orchard from outside sources.—A. P.

Atmospheric Impurities in and near an Industrial Town, The Nature, Distribution, and Effects upon Vegetation of. By Chas. Crowther and A. G. Ruston (*Jour. Agr. Sci.*, vol. iv. pt. i. pp. 25-55; May 1911).—The authors based their conclusions on a three-years' service of analyses of rain samples collected at Garforth, a year's series collected in different parts of Leeds, and a variety of investigations

and observations upon the effects of certain classes of atmospheric impurities upon vegetation.

It was found that the total amount of nitrogen (ammonia and nitric nitrogen) brought down by the rain (26.95 in. per annum) at Garforth was 8.37 lb. for each acre per annum. This is greatly in excess of the average at Rothamsted, which is 3.84 lb. with an almost identical rainfall. A further quantity of nitrogen (about 1.5 lb.) was brought down in the organic matter.

Of sulphur the average annual precipitation was 95.7 lb. SO_3 to each acre, about five times the Rothamsted average.

Chloride was brought down at an average of 20.89 lb. to an acre.

20.05 lb. of free acid was precipitated on each acre per annum, the acidity during foggy weather being remarkably high, and the winter rain (owing largely to fogs) being much more acid than the summer.

The air of Garforth (in an agricultural district) is thus polluted to a remarkable extent, and this suggested a comparison with the air of Leeds. Ten stations were selected in places varying from one another as much as possible. The amount of matter in suspension varied with the kind of industry carried on, being naturally heavier in the coal-mining and industrial centres than in the suburbs. The greatest pollution of this kind amounted to 1,900 lb. to an acre in one case and 1,500 lb. in another, while it was only 90 lb. in the station furthest from the centre of the city. In the worst districts the ash amounted to 60 per cent. of the suspended matter; in the suburban districts to only 45 per cent. The suspended matter was rendered more objectionable by the great amount of adhesive "tar" which it contained. It is remarkable that this amounted to only about 5 per cent. in the contamination arising mostly from the factories and to about 16 per cent. in that arising mainly from the domestic range. In the most polluted area the soot deposited amounted to 840 lb. to each acre annually, and to only 27 lb. at the station furthest from the centre of the town.

The presence of this suspended matter in the atmosphere has a marked effect upon the number of hours of bright sunshine experienced. In the centre of Leeds it amounted to only 1,167 as compared with 1,402 at Adel, four miles north.

The amount of free acid precipitated was not always proportional to the amount of contamination, for alkaline matters are often produced by the factories, and the amount of sulphur brought down did not vary greatly from that observed at Garforth. Chlorine was, however, greatly increased, amounting to 200 lb. per annum at one station. Nitrogen was also increased to $18\frac{1}{2}$ lb. in the most polluted area.

Tables are given showing the effect of atmospheric pollution upon the intensity of the light, and, as the authors point out, its stunting effect upon the little vegetation that survives is very marked. But in addition to this the leaves become coated with a thick black deposit which further checks the incidence of light and which from its adhesiveness tends to block the stomata. Rain is not effective in removing these

tarry particles. The conifers appear to be particularly sensitive in this direction.

The relative amounts of carbon dioxide assimilated by leaves from different stations were calculated and show in a remarkable way the influence of a polluted atmosphere in checking this function. If the amount of assimilation in a leaf from the least polluted area be represented by 100, in the most polluted it was represented by only $11\frac{1}{2}$. In one case where a dirty leaf assimilated $11\frac{1}{2}$, a similar but cleansed leaf assimilated 19, and in another a dirty leaf assimilated 15, and a similar cleansed leaf 24. This check even in the cleansed leaves is accounted for by the blocking of the stomal openings.

The influence of acid water upon the growth of grass was also investigated, and it was found that in time the watering with so weak a solution as one part of acid to 100,000 of water (the acidity of the Garforth rain) produced a detrimental effect. The acid had a marked effect upon the chemical nature of the soil, but especially upon the nitrates present, which is accounted for by the inhibition, partial or total, of the nitrifying organisms by the acid in the soil.—*F. J. C.*

Begonia 'Aurore.' By J. Gervôme (*Le Jard.* xxv., 589, 264; Sept. 5, 1911; 2 figs. and coloured plates).—New winter-flowering begonia. A hybrid of *Begonia socotrana* and *B. Pearcei*, closely resembling 'Gloire de Lorraine,' but with bright, flame-coloured flowers. The author gives an interesting account of winter-flowering begonias in general, and of the principal varieties known in England and France, as well as an historical note on the species to which *B.* 'Aurore' owes its parentage.—*F. A. W.*

Bitter-pit in Apples. Anon. (*Gard.*, Dec. 2, 1911, p. 581; fig.).—This disease has been very prevalent during the past year, not only in soft-fleshed varieties, in which it always occurs more or less, but also in the hard-fleshed ones, though to a less extent. The disease is characterized by small but usually numerous brown spots some distance below the surface, some of which show through the skin. Examination shows no trace of fungus mycelium or bacteria, and the dead spots are to be attributed to some other cause. The dead cells contain starch grains, while the rest of the apple cells contain none, the starch having in the ordinary course been converted into sugar during ripening. This process has been suspended in the case of the dead cells, and therefore the cause of death must have operated before ripening had begun. The prevalence of the disease after this hot summer, and the fact that it is well known in Victoria, Australia, and at the Cape, suggest climatic conditions as the cause; possibly deficiency of water and accumulation of tannin or malic acid may have led to the death of the cells. Remedies suggested are attention to the water supply and shading the fruit.—*H. R. D.*

Bordeaux Mixture, Fungicidal action of. By B. T. P. Barker, M.A., and C. T. Gimingham, F.I.C. (*Jour. Agr. Sci.*, iv., pt. 1; pp. 76-94; May 1911).—The authors discuss the factors which bring the basic copper sulphate of Bordeaux mixture into solution (see p. 449), and incidentally show how "Bordeaux injury" frequently arises. They show that the fungicidal action of the copper sulphate is greatest when the fungal hypha comes in contact with solid particles of the salt, and hence they emphasize the great importance of thorough spraying, so as to distribute the particles over the surface to be protected as thoroughly, closely, and evenly as possible. The fungus itself apparently brings the copper which destroys it into solution, and in all probability the action of carbonic acid from the atmosphere is of but slight importance. The adhesive properties of the spray are obviously important.—*F. J. C.*

Cabbage. By L. C. Corbett (*U.S.A. Dep. Agr., Farmers' Bull.* 433; April 1911; figs.).—This contains an account of cabbage cultivation in the United States, as grown by market-gardeners in the south and as a field crop on northern farms, and the cultural directions here given are varied for each class of grower and for different climates. Soil, fertilizers, enemies, diseases, harvesting, and storage are all treated of, and some advice is given on the economic part of the subject.
M. L. H.

Cabbage Maggot, Work done during 1907 and 1908. By F. L. Washburn (*U.S.A. Exp. Stn., Minnesota, 17th Ann. Rept.* 1909; pp. 196-213; figs.).—A large number of experiments were carried out with a view to devising practicable methods of keeping the cabbage maggot, which attacks almost all vegetables allied to the cabbage, in check. The only cabbage which was not attacked appeared to be the "Holland." The most effective of the methods tried, and the one which seems to promise economic results of importance, was as follows: Steep two ounces of white hellebore in one quart of water for an hour, then dilute with water, to make one gallon. Apply with a watering-pot without a rose a few days after the plants are set out. Give two other applications at intervals of five days, and five or six more at weekly intervals, about a teacupful of the decoction being used for each plant. Several parasites are described, and their attacks appear to be important means of checking the pest.—*F. J. C.*

Calceolaria alba. By W. I. (*Gard.*, Jan. 7, 1911, p. 6; fig.).—The dull summer of 1910 suited this little shrub, which flowered through the whole summer into late autumn. *C. alba* is a Chilean plant, and has been in cultivation since 1844, when it was introduced by Messrs. Veitch. It is shrubby in habit, growing rather more than 1 foot high, with copious foliage and ivory-white flowers, the pouch of which is almost entirely closed at the mouth. Although *C. alba* has been in cultivation so long it is not common,

not being hardy; cuttings should therefore be taken in autumn and protected from frost in frames. *C. hyssopifolia*, which comes from the Andes of Quito, makes a good companion to this plant. It grows about 2 feet high and requires similar treatment.—H. R. D.

Calcium Carbonate, the formation of, in the Soil by Bacteria. By C. T. Gimingham, F.I.C. (*Jour. Agr. Sci.*, iv., pt. 2; pp. 145-149).—The author has studied the formation of calcium carbonate from calcium oxalate by soil bacteria, and has isolated six different organisms capable of bringing about this change. He finds that air is necessary for its occurrence, and that the presence of much organic matter delays the change. It would appear that the organisms are rather driven to the oxalate by lack of other food material.—F. J. C.

Campanula punctata. By Wyndham Fitzherbert (*Gard.*, Sept. 23, 1911, p. 458; fig.).—This *Campanula*, though introduced into this country in 1813, is seldom met with now. It is a vigorous perennial, about 2 feet high, with large hairy cordate ovate leaves. It blooms well in the summer, and the secondary shoots often bloom in autumn. The flowers, 2 to 3 inches in length, form long trumpets, with deeply cut mouths, profusely spotted in the interior with minute crimson purple dots. The flowers are hairy, and sometimes instead of white they are of a soft colour, and occasionally violet. These variations have caused some of them to be considered as distinct species; e.g. Lindley described a plant sent home by Fortune from China as *C. nobilis*, but later this was determined to be only a variety of *C. punctata*. It is a native of Siberia, but also found in China, Japan, and Korea. Coming from a cold country it is quite hardy, and succeeds in ordinary garden soil.—H. R. D.

Carnations (*Jour. Soc. Nat. Hort. Fr.*, series iv., vol. xii., July 1911, p. 392).—A note on the various diseases to which Carnations incur is liable, with the appropriate remedy for each.

Thrips should be treated with solutions of nicotine.

For *Grey Rot* (*Botrytis cinerea*) dry the atmosphere of the house, give air and fumigate with formalin, or some disinfectant, or apply sulphur or alkaline sulphide in a solution of 3 grammes per litre.

The calyx of the Carnation sometimes shows large irregular whitish patches, due probably to *Septoria Carthusianorum*, syn. *S. calycina*. This is not a dangerous disease.

There are two sorts of caterpillar which rest in the soil by day and feed on the leaves of the Carnation at night. These can only be destroyed in the soil, for which purpose apply fumes of carbon bisulphide or sulphuretted hydrogen.

The several species of beetle (*Haltica*) can be controlled by applications of any insecticide. A disease which has done much harm among Carnations at Antibes has been called "Antibes Carnation Disease." The stems get soft, the leaves bend down, the plant dries up, turns

yellow, and dies. It is caused by a fungus, *Fusarium vasinfectum*. To combat it disinfect the soil.

All diseases which spread from the soil may be treated with fumes of sulphuretted hydrogen produced by the decomposition of sulphur compounds in the soil, or with fumes of bisulphide of carbon used as in viticulture.

Rusts may be treated with applications of sulphur or alkaline sulphides.

Diseases which cause brown, violet, or blackish patches must be treated with salts of copper.

Some of the Pinks are attacked by special fungi peculiar to themselves, but may all be treated as for ordinary fungus diseases.

M. L. H.

Celmisias at Kew. By W. T. (*Gard.*, June 10, 1911, p. 274; fig.).—Special attention has recently been given to the cultivation of *Celmisias* at Kew, with the result that several species have now become established. They are planted in a small rockery in a sheltered corner with a north-east aspect. They thrive better in a moist and shady situation than in a sunny one. Though quite hardy, they require protection from damp in winter and from east winds in spring. They chiefly inhabit the mountains of New Zealand, but one or two species are Australian. *C. Brownii* is one of the largest species, the leaves are 10 to 16 inches long by 3 inches broad, the under-surface clothed with a soft brown tomentum, and the flowers 3 inches in diameter.

C. coriacea, known as the 'Kid Glove' plant from the white felt clothing its leaves, has flowers 4 inches across. *C. holosericea* is very floriferous, forming a large tuft, the leaves green above with a white silky under-surface; the flowers are 3 inches across.

C. petiolata, of robust growth, resembles *C. Brownii* in foliage, but the flowers are smaller. Other species are *C. discolor*, *C. Mackayii*, *C. Munroi*, *C. hieracifolia*, *C. Lindsayi*, *C. robusta*, *C. spectabilis*, *C. viscosa*, and *C. verbascifolia*.—H. R. D.

Cistus florentinus. By E. A. Bowles (*Gard.*, Sept. 2, 1911, p. 422; fig.).—This is one of the most useful of the family for forming a low flat bush or hanging over a stone. It is now regarded as a hybrid form, its parents being *C. monspeliensis* and *C. salvifolius*, and this is borne out by its sterility; but it is easily propagated from cuttings in the early autumn. The purity of its white flowers with yellow centres is well set off by the rich green of the leaves. It should have a sunny, well-drained position, and the plants should be renewed every three or four years.—H. R. D.

Citrus Fruits, A Study of the Improvement of, through Bud Selection. By A. D. Shamel (*U.S.A. Dep. Agr., Bur. Pl. Ind., Circ. 77*, June 1911; figs.).—This is an account of the preliminary

steps which have been taken in the direction of improving the different strains of Citrus trees in the groves of California. Hitherto little or no selection of buds has been practised. The buds are mostly procured from successful growers of a given variety, without any regard to the bearing capacity of the individual parent, and in some instances they are even cut from nursery stock, when no selection based on crop production is possible. This indiscriminate method of obtaining buds for propagation may be partly due to the fact that the introduction of commercially successful varieties of Citrus fruits into California is comparatively recent, and so far the demand for these trees has been greater than the supply. It has been found, however, that there are desirable qualities in individual trees which may be handed on, and the first object of these investigations was to determine definitely the performance of individual trees under uniform conditions for a period of at least five years. Having ascertained that some trees habitually yield larger crops of more valuable fruit than other trees of the same variety under like conditions, and further that these desirable qualities are transmissible to young stock propagated from such trees, it follows that the propagation of an improved type of the variety from selected individual trees should be both possible and practicable.

So far the trees have not been long enough under observation for it to be safe to assume that the good and bad yielders are quite consistent in their behaviour. A series of consecutive performance records is necessary before selecting reliable stock, and methods of securing these data and tabulating them for intelligent interpretation are described in this bulletin. The investigations are being carried on at present with Washington Navel Oranges and Marsh Pomelos near Riverside, California, and if desirable the work will be extended to other districts of the Citrus belt and to deciduous and other fruits.—*M. L. H.*

Club-root disease in the Cabbage family. By D. Houston (*Gard.*, March 4, 1911, p. 97).—This well-known and troublesome disease manifests itself first in the form of tiny swellings upon the young roots of seedlings which, as the plants grow, get bigger, until finally the greater part of the root system is converted into an enlarged mass of diseased tissue. In the last stage of the disease the root passes into a soft rot, and gets gradually incorporated with the surrounding soil. The disease is due to a fungus which lives as a parasite within the tissues of the root. It has been found that this fungus thrives best in an acid soil. The remedy in such cases is heavy dressings of quicklime at the rate of thirty-five bushels to the acre (about one peck to the rod). While this seems the only practical remedy, the following precautions are recommended:—

(1) Examine the roots of the seedlings and burn those that show signs of disease.

(2) Avoid using manure likely to contain roots of clubbed plants, and do not carry soil attached to boots that have walked on or use tools that have worked in club-infested ground.

- (3) Keep the soil sweet and give lime frequently.
- (4) If club-root is discovered, raise the plants and burn those affected.
- (5) Arrange rotation that crucifers will not succeed one another.
- (6) Keep down cruciferous weeds, *e.g.* Shepherd's Purse and such like.—*H. R. D.*

Club-root disease in the Cabbage family. Anon. (*Gard.*, March 18, 1911, p. 126).—The writer had to deal with the cultivation of winter greens on ground where the soil had become sour and club-root disease was prevalent. He dug in lime and a peck of salt to each square rod every spring, and in two years the plants grown were free from disease and grew freely in dry seasons.—*H. R. D.*

Coccidae of Audubon Park, New Orleans. By T. C. Barber (*Jour. Econ. Entom.*, iii. 5; pp. 420-425; Oct. 1910).—A list of thirty-four scale insects with their hosts.—*F. J. C.*

Coccidae of Boulder County, Colorado. By T. D. A. Cockerell (*Jour. Econ. Entom.*, iii. 5; pp. 425-430; Oct. 1910).—A list with notes of scale insects of a portion of Colorado. Interesting notes of distribution with plants are included.—*F. J. C.*

Corn, Improvement in. By H. K. Hayes and E. M. East (*U.S.A. Exp. Stn., Connecticut, Bull.* 168, June 1911; plates).—Logically directed efforts to improve the general field crops of the United States may be said to have begun with the introduction of Vilmorin's isolation principle. In applying this principle to Indian corn breeding a large number of selected ears are grown in such a way that the yield of each ear may be compared with that of every other ear, and the average character of a plant's progeny is taken as an index to that particular plant's productiveness. Continued selection by this method yielded very promising results during the early years of its application, but the later generations failed to fulfil this promise. This bulletin considers the reasons for this failure, and points out the possibilities which lie open in other methods, based on the fuller understanding which we now possess of the underlying principles concerned.

The process of fertilization acts in two very different ways: first through a union of the hereditary characters possessed by the parents, and second through a stimulation to the cell-division necessary for normal development; and since the re-discovery of Mendel's law in 1900 our knowledge of this first process—the transmission of parental characters—has been greatly increased. It has been clearly proved that a plant or animal does not transmit its characteristics as if the entire organism were the unit, but rather that its various characters are inherited separately. Such characters are known as "unit characters," and if a plant breeds true for one of these characters its "unit" must have been received from both of the parents, and is said to be in a

"homozygous" condition. When a character is found in only half the reproductive cells, it is said to be in a "heterozygous" condition, and progeny of different types are produced.

A certain stimulus to development probably accompanies every act of fertilization, but what is of special interest to corn-breeders is that this stimulus is far greater in a hybrid than in a pure-bred variety, since these so-called pure-bred varieties are in fact only varieties exhibiting characteristics perpetuated by man through selection, such selection being obviously only another name for in-breeding. It so happens that isolation is not in practice a very easy matter with Indian corn, since the plant is naturally constructed for cross-fertilization, and the pollen, being produced in enormous quantities, is widely carried by the wind; and since an immediate cross between two types is more vigorous and productive than either type in a pure state, it follows that when the best ears are chosen in a field for perpetuation, just those are likely to be selected which are in a hybrid condition and which will not breed true.

Tables are here given showing the effect of in-breeding on yield and giving the comparative yield of normal corn, in-bred corn, and of various crosses, all which make it clear that the increase of vigour due to crossing is obtained only in the first hybrid generation. It appears therefore that, to obtain a crop of corn showing uniformly desirable characteristics and at the same time vigour of growth, it is necessary to in-breed two strains until those characteristics have become fixed, and then cross to obtain vigour of constitution, and to repeat this process for every commercial crop. As this would be obviously an unprofitable proceeding financially, this bulletin suggests further experiments with first crosses between several of the well-established strains of corn already grown in different parts of Connecticut.—*M. L. H.*

Cotton, Hindi, in Egypt. By O. F. Cook (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 210, May 1911; plates).—So far all attempts at acclimatizing the high-priced Egyptian varieties of Cotton in America have been prejudiced by the difficulty in keeping the crop pure. Partly this is due to the fact that it is grown in the same localities as American Upland Cotton and is hybridized with that by bees, but the imported Egyptian seed itself is contaminated with what is known as "Hindi" Cotton, an inferior plant, which is nearly always to be found in Egyptian Cotton-fields. Its presence is not so serious a matter there, as labour is so cheap and plentiful that it pays the grower to have the Cotton sorted by hand after gathering. In America, however, labour conditions are so different that this would not be profitable, and this Bulletin suggests other ways of coping with the evil.

The injury caused by Hindi contamination is not limited to the proportion of Hindi plants and obvious hybrids that are counted in the fields. Many plants not readily distinguished as Hindi hybrids at earlier stages of growth give later indications of hybrid nature in white flowers, pale-green bolls, sparse, inferior lint, or in relative or complete sterility.

The greater popularity of the brown-tinted varieties of Egyptian Cotton may be explained by the advantage that the colour gives in sorting out the inferior white Hindi fibre. The exclusion of the Hindi Cotton by a more efficient system of selection will enable white varieties to be grown in Arizona, and thus produce longer and stronger fibre than brown varieties are likely to afford. A study of many variations and hybrids of Egyptian Cotton shows that there is a distinct tendency for brown colour to be associated with short fibres.—*M. L. H.*

Crown-gall on Minnesota Raspberries. By F. L. Washburn (*U.S.A. Exp. Stn., Minnesota, 17th Ann. Rept. 1909; pp. 235-241; figs.*).—Crown-gall is reported to have attacked raspberries and to be on the increase in Minnesota, where it is very destructive to the plants. It is recommended to burn all affected plants.—*F. J. C.*

Cucumbers and Cantaloupes, Spraying. By T. C. Johnson (*U.S.A. Exp. Stn., Virginia Truck Exp. Stn., Bull. 5, March 1911*).—There has been an alarming increase in fungus disease among the Cucumber and Cantaloupe crops in part of Virginia, and this bulletin is an account of experiments with spraying mixtures. The experiments were carried on for several years with home-made Bordeaux mixture, sulphuride, self-boiled lime-sulphur, and commercial lime-sulphur respectively. The sulphuride mixture was prepared with 1 part of sulphuride to 200 parts of water. The self-boiled lime-sulphur was prepared with 8 lb. sulphur, 8 lb. stone lime, 50 gallons of water. The commercial lime-sulphur was used 1 part to 50 parts water. Tables are given showing the comparative yield of the plants treated with these different mixtures, the general result being that Bordeaux mixture increased the yield while the other mixtures decreased it to a greater or less extent.—*M. L. H.*

Cyclamen ibericum (*Die Gart.*, Dec. 23, 1911; pp. 705).—A beautiful species, hardy even in the north of Europe, forming its dark green leathery leaves during the late autumn, and producing its handsome flowers, either rosy red or white in colour, during the months of January till April. In a suitable shady spot and in humus they readily increase by self-sown seed.—*G. R.*

Daffodils and the Heat. By Rev. Joseph Jacob (*Gard.*, Oct. 28, 1911, p. 523, and Dec. 9, 1911, p. 593).—The writer notices that daffodil bulbs are keeping badly this year, and finds many cases where bulbs are affected by rot. The beginning stage is hard to detect; the bulb feels a little soft, and the outer skin does not look quite right; if it is removed there is a peculiar greyish appearance on the inner integument; the base seems to harden and go brown, followed by a grey rot which gradually extends from the base upwards over the whole bulb. Then a ring of mould appears round the base, and decay rapidly takes place. Mr. Chittenden found that they were attacked by a fungus *Fusarium bulbigenum*, of the appearance of which he could

find no record since it was first described in "Grevillea" about twenty-three or twenty-four years ago. Samples of bulbs had also been submitted by Mr. Jan de Graaf to the Phytopathological Institute, Amsterdam, and they reported them to be attacked by *Fusarium bulbigenum*, adding that this fungus only thrives when the temperature gets above a certain degree, and also when there is a certain moisture. Mr. de Graaf states that bulbs kept spread out absolutely dry from the moment they were lifted did not suffer. The writer, however, refers to a case where a small stock of bulbs, stored where crowding was improbable, had been affected.—H. R. D.

Daikon (Japanese Radish). By R. de Noter (*Le Jard.* xxv. 576, p. 54; Feb. 20, 1911).—Eight varieties of this Japanese vegetable are recommended. They are much appreciated in their native country, and contain a high proportion of nitrogen. They are used like turnips, but have more flavour. They prefer a sandy soil with plenty of manure dug in, and are best taken up when the frost has cut the leaves. The slow-growing varieties must be sown April-May, and require four to five months for development; the faster sorts should be sown in the last two weeks of July, in rows 70-80 cm. apart; the seeds should be 25-30 cm. apart, and should be thinned out as soon as the plants are tall enough. They make vigorous foliage and never require watering, beyond that provided naturally by rain. Animals feed greedily on daikons. The crop can be stored in November and December in a cellar or silo, keeps till March, and is equivalent in its nutritive properties to the potato.—F. A. W.

Dimorphic branches in Tropical Crop Plants. By O. F. Cook (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* No. 198, Jan. 1911; plates).—It is here pointed out that in five plants of tropical America—Cotton, Coffee, Cacao, the Central American Rubber Tree, and the Banana—definite dimorphism of the branches exists and has not hitherto been sufficiently taken into account, either in breeding new varieties or in the ordinary operations of cultivation and pruning. In each of the five species of plants concerned there is a definite relation between the function of the branches and their positions or places of origin on the stem, but there is no general relation of position to function that applies to all these species or even to any two of them. It is necessary to consider each plant separately in order to understand the agricultural importance of the dimorphism of its branches. The subject is here minutely considered; the origin of the structural differences is traced from the "metamers" or units of organic structure of which each plant is made up; the position, the sequence, the point of departure, and the function of each type of branch is given for each species of plant, and the various reasons which make the fact of their differentiation important to cultivators is pointed out.

In the case of the Cotton plant it has been noticed that one result of the change of climate resulting, for instance, from importing plants

from Central America to Texas has been that the natural sequence of vegetative and flowering branches is interfered with, the plants becoming large leafy bushes with many sterile limbs, but with very few fruiting branches or none at all. A gradual return of the plants to their normal habits of branching has marked the process of acclimatization.

The two sorts of branches of the Banana plant are described as (1) sword suckers and (2) broad-leaved suckers, and a table is added giving a summary of the classification of branches in the four woody plants here considered under the following heads:—

1. Origin:

Natal buds.

Adventitious buds.

2. Position:

Axillary.

Adaxillary.

Extra-axillary.

3. Reproductive Function:

Fertile.

Sterile.

4. Vegetative Function:

Able to form main stems.

Not able to form main stems.—*M. L. H.*

***Elliottia racemosa*.** By A. O. (Gard., Sept. 30, 1911, p. 472).—This extremely rare shrub, beside being of interest botanically, is of considerable decorative value, and it flowers at the end of July and early August, when flowering shrubs are by no means common. It is a monotypic genus, named after Stephen Elliott, who discovered it growing wild in Georgia at the beginning of the last century. There are two plants at Kew growing in a bed of heather, and these are believed to be the only ones in Europe. They have been there since 1902, but they flowered this year for the first time. The plant forms an upright pyramidal shrub and is quite hardy at Kew. The flowers are pure white, 1 inch across, borne in erect terminal racemes 6 to 8 inches in length, bearing forty to eighty flowers, but not more than a quarter of these are open together. A successful means of propagation is yet to be found; though artificial pollination has been tried and bees have been attracted to the flowers in large numbers, no fruits have been obtained.—*H. R. D.*

Experimental Error of Field Trials. By W. H. Mercer and A. D. Hall (*Jour. Agr. Sci.*, iv., pt. 2, pp. 107-132; Oct. 1911).—The authors discuss the amount of error to be expected in any trials of crops and the method of reducing it to the smallest possible size, recommending the use of several plots of small area instead of a smaller number of large plots.—*F. J. C.*

Fertilizers, Plot Experiments with. By J. H. Steward and Horace Atwood (*U.S.A. Exp. Stn., West Virginia, Bull.* 131; Nov. 1910; plates).—The soil on which these experiments were tried is a Permeo-Carboniferous one, lightish, of a sandy texture, easily tilled, but drying too rapidly in summer. The fertilizers tried were sodium nitrate, stable manure, acid phosphate, potassium sulphate, and lime, in varying quantities and combinations.

The results are given for each year and were continued for eleven years. The conclusions drawn from the work of the whole period are as follows:—

That the stock of phosphoric acid in the soil was so low that this deficiency had to be supplied before either nitrogen or potash was of any value. When once the phosphoric acid was supplied, however, the want of the other two constituents was at once felt. Applications of lime have so far not proved of much benefit.

Within the limits of the crops grown it may be said that a fertilizer which gives good results with one crop will give good results with another crop grown on the same or similar soil. There are, however, some minor exceptions to this rule. Indian corn responds more favourably to a dressing of stable manure than it does to an application of commercial fertilizer, while with Cowpeas the opposite is true. Stable manure has again demonstrated its great value as a restorer of fertility to a poor worn-out soil. More manure should be produced on West Virginia farms, and it should be applied more systematically and more intelligently than it is at present.—*M. L. H.*

Fokienia, A new genus of Coniferae. By Aug. Henry (*Gard. Chron.*, xlix., p. 67; Feb. 4, 1911; 4 figs.).—An account of a tree described by Mr. S. T. Dunn in 1908 as a new species of *Cupressus* which had been discovered by Captain Hodgins. After a careful examination of material received from Mr. H. Clinton Baker, with the assistance of Mr. H. Hamshaw Thomas, the writer comes to the conclusion that the tree in question should be made the type of a new genus—namely, *Fokienia* A. Henry and H. H. Thomas. It is intermediate in its characters between *Cupressus* and *Libocedrus*, and may be briefly characterized as an evergreen tree belonging to the Cupressineae, with cones similar to those of *Cupressus* (section *Chamaecyparis*) in being globose in form, and composed of numerous peltate scales, but with each scale bearing two seeds which are like those of *Libocedrus* in having two very unequal lateral wings, while the foliage is nearly identical with that prevalent in the Chinese and North American representatives of the last named genus.

Only a single species, *Fokienia Hodginsii* A. Henry and H. H. Thomas, is known. It is a tree which reaches a height of forty feet and three feet in girth. The foliage is described in detail and compared with that of *Libocedrus macrolepis*. In adult trees the arrangement of leaves on the main axes in older branchlets differs in the two genera. No staminate flowers have been observed. The female ones

are described in detail. They resemble very much those of *Cupressus Lawsoniana*. The seeds furnish the most important character of its new genus. In *Cupressus* the two lateral wings of the seed are very narrow and equal, and surround nearly the whole of the seed, whereas in *Fokienia* the wings are lateral and very unequal, and appear to be derived from the scale of the cone.

The tree is said to be rare, and occurs in the province of Fokien in the Tung-fu district at a few hundred feet above sea-level on the northern slope of one valley about twenty miles from the sea. It is suggested that the new Conifer ought to succeed in the south-western counties of England and in parts of Ireland and Wales where the climate is mild.—A. S. H.

Fokienia Hodginsii, Structure of the Wood. By E. R. Burden (*Gard. Chron.* xlix. p. 84; Feb. 11, 1911; 3 figs.).—A short description is given of the structure of the wood in the new genus of Coniferae described by A. Henry and H. H. Thomas in the *Gardeners' Chronicle* of February 4, 1911. The wood appears to present a greater resemblance on the whole to that of *Cupressus* than to that of *Libocedrus*. The resin cells are, however, much more numerous in *Fokienia* than in any other species of *Cupressus* examined by the writer.—A. S. H.

Fruit and Nut Orchards of China, Agricultural Explorations in the. By F. N. Meyer (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 204; March 1911; 6 plates, 15 figs.).—The Chinese Empire is very rich in fruits and nuts, and it is possible some of them are worth introducing into other lands, where the domestic and soil conditions are similar, either for direct cultivation or for hybridization. The Chinese are great lovers of fruits, growing them whenever there is a chance to do so. They understand the arts of grafting, budding, and layering to preserve old varieties, but they are much less successful in originating new ones. They never prune their fruit trees, with the exception of the grape, but the soil of all orchards is carefully cultivated, except in those of the jujube. Nothing is known of spraying and little of insecticides, and it is apparently only the abundance of parasites which prey upon scale and other insects which makes fruit-growing practicable with any degree of success. The peculiarity of the Chinese taste is that, as a rule, they do not care for soft fruits—preferring unripe apricots and pears, for instance, to those which are ripe.

Persimmons (varieties of *Diospyros Kaki*) are perhaps the most important fruits of Northern China. In one small village in Chihli the author was assured in 1908 that the crop of the previous autumn had brought in about \$10,000 Mexican. Some of the less juicy varieties are extensively used for conversion into dried fruits, which resemble figs in appearance. All the persimmons in Northern China are ring-budded or grafted upon the wild *D. Lotus*, a species that bears small black fruits full of seeds. The writer only once found a few specimens

of the apparently true *D. Kaki* growing wild, and this bore small greenish-yellow fruits of an unpleasant flavour, with imperfect seeds. As a stock *D. Lotus* gives to its host a longer life than the native American persimmon seems to do, trees being found in China that are centuries old and still very productive (pp. 10-16).

Peaches are the most highly appreciated fruit of Northern China. Three important strains have been developed, and it is asserted that some of the most valuable commercial kinds in the United States are of Chinese origin, having proved more successful in the South than the varieties introduced from Europe. The thriftiest and healthiest peach trees are always seen at the foot of a mountain, growing in decomposed rocky or sandy soil, and there the fruit is of a much finer flavour than when grown on low, rich land. In the peach orchards seedlings and budded trees are mixed, and varieties are innumerable. A small-fruited variety grows in Kirin, Manchuria, where the thermometer sometimes drops to -40° F. It is suggested that the hybridization of this and other varieties of these cold climates may make it possible to raise hardier peaches for districts subject to severe winters. Bud-wood of peaches, however, is difficult to convey long distances, as the buds become spoiled, though the wood remains green and healthy. Though it is disputed whether China is the original home of *Amygdalus Persica*, there is one native species, *A. Davidiana*, which the Chinese use as a stock for almost all stone fruits. It is remarkably drought-resistant, and preliminary experiments show that it thrives equally well in Iowa and Texas (pp. 16-19).

Apriots (vars. of *Prunus Armeniaca*) are extensively cultivated, being grafted or budded upon seedling apriots or the wild peach referred to above. The apriots of Shantung are famous, there being several very good varieties. There is a strain in Chihli which has sweet edible kernels which are sold as almonds (p. 53), but the writer has never seen a true almond tree in China. The wild apriot is very common in Northern China and Korea, and even occurs in Eastern Siberia, sometimes as a shrubby form and sometimes as a tree, one specimen being found in Korea which was forty feet high and with a trunk ten feet in circumference. The fruit is small and worthless, but it might be valuable as a stock or for hybridization. Some of the Asiatic apriots have proved hardy at Boston, Mass., and in the trying climate of Wisconsin (pp. 20-22).

Plums (*Prunus* sp.) are not very highly esteemed in China, but Shantung produces some good varieties, and there are some very hardy kinds in Northern Korea and Eastern Siberia. One fruit is grown, which is possibly a hybrid between the apriot and the peach, though it is sour, like a plum, while another kind of fruit, found at its best in Shantung, is the plumcot, or plum-apriot, which is large, red, sweet, and aromatic (p. 22).

Cherries.—The most common in Northern China are the "bush cherries" (*Prunus tomentosa*), which are usually budded and grafted on the wild peach (*A. Davidiana*), upon which they make even faster

growth than on their own roots. In a wild state they grow in dry, rocky places in the mountains. Sweet cherries (*P. Avium*) appear not to be grown in the north, but in the moist and mild-wintered regions of the Yang-tse Valley sour cherries (vars. of *P. Pseudo-cerasus*) are grown, the fruit of which is small, generally sour, and very early. A scion of one of these was grafted in the spring of 1906 upon the Mazzard cherry at Chico, California, and the following year it bore fruit which was half-grown on April 12, a time when other cherries were just in bloom (pp. 23 and 24).

Jujubes (vars. of *Zizyphus sativa*) are quite an important fruit in Northern China, growing wherever winter temperatures are not too low, and standing a remarkable amount of neglect without any apparent detriment. Some farmers ring their trees every year, claiming that thereby they considerably increase the crop (pp. 35 to 40).

Grapes are much esteemed, and great care is taken of the vines, which are always grown trained over arbours, and, after the first cold snap in October, taken down, pruned, and tied together in bundles, and laid in pits four to six feet deep, where they are covered with sorghum stems and old mats and a couple of feet of soil over these. Where it is too cold for varieties of *Vitis vinifera*, its place is taken by *V. amurensis*, which withstands temperatures of -40° F. (pp. 40-42).

Walnuts and chestnuts are not propagated by grafting, all the trees being seedlings, so that there is a great variation in the character of the fruits, and, in the case of the walnut, of the trees also (pp. 51 and 52).

Many other fruits are more or less briefly dealt with. The true Chinese quince (*Cydonia sinensis*) is said to produce fruits sometimes a foot long and ten pounds in weight (p. 32). Edible haws (vars. of *Crataegus pinnatifida*) are largely grown, the fruits of the best kinds being as large as good-sized crab-apples. As the tree is very hardy and endures considerable drought and heat, it is suggested as a substitute for cranberries where the latter are hard to obtain (pp. 33 and 34). Loquats are extensively grown in Chekiang, and it is stated that from the village of Tangsi alone \$20,000 worth (Mexican) were exported in 1906 (p. 35).

The Citrus group is well represented, and there are said to be more than eighty different varieties of edible oranges growing along the south-eastern coast and on the islands fringing it (pp. 42-45).

The Chinese understand the principles of cold storage thoroughly. Grapes are kept from one year to another by storing them in deep, dug-out cellars, kept cold with baskets of broken ice placed among the baskets of fruit. Fruit merchants usually keep perishable fruits in thick-walled earthen jars with broken ice in the bottom, and closed with a wooden lid with a strip of felt round it (pp. 50 and 51).—A. P.

Fruit, Varieties of, Originated in Michigan. By S. W. Fletcher (*U.S.A. Exp. Stn., Michigan, Spec. Bull. 44*; Aug. 1910; illus.).—A descriptive list of 185 varieties, of which only fifteen are known to have resulted from a definite attempt to originate them by crossing.

It is thought that as fruit-growing becomes more specialized, greater prominence will be given to local kinds, as they are likely to thrive better and therefore produce fruit at a lower cost than cosmopolitan ones. Improved varieties are badly wanted, and the writer gives a summary of replies from a large number of growers as to what characteristics, or combinations of characteristics, in new varieties would be most profitable (p. 6). It is urged that every fruit-grower should raise a few seedlings, and, if he does no crossing, select seeds from varieties he thinks most likely to produce the kind of variety needed, giving the preference to those of any tree standing near another, cross-pollination with which might give the desired results (p. 5). He should be on the watch for bud variations in existing varieties which, when they are sufficiently marked and valuable, might be the starting-point of new varieties. No new variety should be introduced which is not strikingly better than existing ones in some important respect, bearing in mind that the standard of excellence is rising (p. 8).—*A. P.*

Fumigation-box materials. By W. E. Hinds (*Jour. Econ. Entom.*, iii., pt. 3, pp. 394-398; Oct. 1910).—The author shows that most of the materials used for making boxes in which fumigation is to be carried out permit the easy diffusion of the gases evolved. He recommends, as the result of experiments which are described, that "in the construction of fumigation boxes we should depend for gas-tightness upon heavy paper, with the edges and overlappings securely sealed, as by glueing, more than upon the quality of lumber, the tightness of the joints, or even a finishing coat with any material which we have yet tested for resistance to carbon di-sulphide vapour. With hydrocyanic gas there will be less difficulty, because of its lack of the solvent power possessed by the carbon di-sulphide."—*F. J. C.*

Garden Notes, 1910. By E. R. Bennett (*U.S.A. Exp. Stn., Colorado, Bull.* 172, Nov. 1910).—The climate of Colorado has been given a bad name among horticulturists. This bulletin gives the results of experiments, which show that with proper care and with due regard to local conditions it is possible to raise crops of beet, Brussels sprouts, beans, cabbage, cauliflower, and indeed of most North American garden vegetables, even in the higher altitudes of the State.—*M. L. H.*

Gladiolus primulinus. By J. M. Duvernay (*Le Jard.*, xxv., 575, p. 40; Feb. 5, 1911; coloured plate).—The author describes the hybrid yellow gladioli produced by MM. Cayeux and Le Clerc from *Gladiolus primulinus* and *G. gandavensis*, *Lemoinei* and *nanceanus*, comparing them with the hybrids obtained at Kew from *G. primulinus* and *G. dracocephalus*, *Colvillei albus* and *Lemoinei blanc*. The race shows steady improvement as regards purity and brilliancy of colour, and a more open and less hooded type of flower. The author points out the peculiar formation of bulbils in the vegetation of *G. primulinus*. They are developed on long stolons, independent of the mother bulb,

instead of close to it as in other *Gladioli*. The bulbs therefore mature and flower much more quickly.—*F. A. W.*

Gnaphalium orientale, Culture in France (*Die Gart.*, Oct. 14, 1911, pp. 375).—This plant was first introduced about a hundred years ago to the Riviera and other parts of France with a generally warm and dry climate. Formerly only about thirty acres were grown, which have now been increased to about five thousand acres. The culture is usually undertaken by small families or small proprietors of a few acres of land suitable for flower-growing, and the profit on the flowers is fairly high, while the labour is small. The flowers, when developed, are dried; some are bleached to a pure white, others are dyed red, or, in fact, any colour, but the greater part are left with their natural golden yellow colour. By far the largest quantity of these so-called 'Immortelles' is sent to the United States of America, with a heavy protective duty of 25 per cent., or, if sent in wreath form, of 60 per cent. import duty. California and Mexico have tried to grow, and do away with French import, but they have not succeeded.—*G. R.*

Hellebores. By F. Leplace (*Le Jard.*, xxiv., 572, p. 378; Dec. 20, 1910; 1 fig.).—A good general article on the genus *Helleborus*, and the eight to ten species which it comprises. The author tries to clear up the nomenclature, and describes the following groups and their respective varieties, of which he gives the characteristics. 1, *Helleborus niger* L., two varieties; 2, *H. orientalis* Gars. (syn. *H. officinalis* Salisb.), seven varieties; 3, *H. viridis* L., two varieties; 4, *H. odoratus* W. and K.; 5, *H. lividus* Ait. (syn. *H. foetidus* L.), var. *B. H. triphyllus* Lank., one variety; 6, *H. foetidus* L.; lastly, 7, *H. hybridus*, which includes a numerous series of hybrids cultivated in the last twenty-five years. The author points out that the fault of most of these garden varieties is that the flowers droop; horticulturists should aim at obtaining new varieties with erect flowers similar to the Christmas Rose. Ample directions are given for cultivation.—*F. A. W.*

Heterocampa guttivitta, natural control of. By W. F. Fiske and A. F. Burgess (*Jour. Econ. Entom.*, iii., pt. 5; pp. 299-394).—The beetle *Calosoma frigidum* was found to feed extensively on the pupæ of the gipsy-moth, and the egg-parasite *Telenomus graptæ* destroyed a large number of eggs. These two factors appear to be keeping the gipsy-moth under control in certain parts of the United States.—*F. J. C.*

Hollyhock Rust (Der Malvenrost (*Puccinia malvacearum* Mont.), seine Verbreitung, Natur und Entwicklungsgeschichte). By J. Eriksson (*Kungl. Svenska Vetensk. Handl.*, Bd. 47, No. 2; pp. 125; June 1911; plates and figs.).—This very full account of the too well-known hollyhock rust deals with the introduction and spread of the fungus *Puccinia malvacearum* into the various parts of the world, and gives a long account of its life-history and effect on the

plants attacked, together with the results of inoculations of a large number of different potential hosts. The author announces the discovery of a mycoplasma similar to those he has described for the grain rusts for this species as well.—*F. J. C.*

Humus, The Determination of. By F. J. Alway, E. K. Files, and R. M. Pinckney (*U.S.A. Exp. Stn., Nebraska, Bull.* 115; June 1910).—Samples of thirteen soils were subjected to treatment to determine their percentage of humus—a term used here to denote only the part of the organic matter dissolved by ammonia (a 4 per cent. solution) after the lime and magnesia have been previously removed by treatment with dilute hydrochloric acid (p. 9). The results obtained by treating the same soil differed by 10 to 230 per cent., according as the Hilgard or the “official” method was employed. The latter is the one commonly accepted in America and England, though the most important data concerning humus have been obtained by Hilgard. The results of the determination of humus ash vary even more than in the case of humus, the amount found by the “official” method (Huston-McBride) being from 4 to 38 times as much as that found by the Hilgard (p. 11). The writer regards the latter method as entirely reliable and the former entirely unreliable. The humus extract obtained by the Huston-McBride method, after being passed through a properly prepared porcelain filter to remove the clay which that method permits to become incorporated with it, gives results which are concordant with those obtained by the Hilgard method (p. 5). Ammonia solutions of different strengths were not found to have the same solvent power for humus. In reporting the humus the per cent. of humus ash should also be given, as it serves as an indication of the reliability of the humus determination.—*A. P.*

Insect-Catching Machine. By F. C. Bishopp (*Jour. Econ. Entom.*, vol. iii., pt. iii. pp. 314-315; June 1910).—A large cage open on one long side on wheels containing a powerful lamp to attract moths is figured. It is drawn over the infested fields and has proved effective in capturing numbers of moths.—*F. J. C.*

Insecticide Act of 1910 (*Jour. Econ. Entom.*, vol. iii., pt. iii., pp. 275-282; June 1910).—An Act has been passed by Congress setting a standard composition for Paris green and lead arsenate, and prohibiting the manufacture or sale in the States or Alaska of any adulterated or misbranded “insecticides, Paris green, lead arsenates, or fungicides, or articles which enter into the composition of insecticides or fungicides.” This Act should do much to make the use of insecticides more reliable, since in using a standard article the user will know with what he is dealing.—*F. J. C.*

Iris albo-purpurea colchestrense. Anon. (*Gard.*, May 13, 1911, p. 226; coloured plate).—This *Iris*, a seedling from the late Max Leichtlin, differs from *I. albo-purpurea* (figured in *Bot. Mag.* and the

(Garden some years since) in the markings on the falls not being so faint and spotted, but a much darker blue, the whole fall being nearly suffused with colour. It is nearer the var. *coerulea* from Japan, but this is pale lavender and of a duplex form rather like a small *I. Kaempferi*.

H. R. D.

Iris bucharica. By W. I. (*Gard.*, April 15, 1911, p. 176 and fig. 177).—This has been in cultivation about ten years. It belongs to the Juno section and is closely allied with *I. orchoides*. It is of erect habit 18 inches high, the flowers white in the upper portion, the falls and crest rich golden yellow with deeper coloured veins in the blade. It is hardy in a well-drained soil in a sunny position, but requires plenty of moisture when in growth; it makes a good pot plant.

H. R. D.

Iris Willmottiana. By C. F. Ball (*Gard.*, March 18, 1911; fig.).—Introduced a few years ago by Van Tubergen from the mountains of Eastern Turkestan; is a dwarf Juno and flowers in April. It is similar to *I. caucasica* in habit, with glistening green back and white horny margins to the leaf. The flowers are sessile in the axils of the leaves, from three to seven being borne on each stem, opening downwards in succession. They are soft lavender blue with blotches of white on the fall.—H. R. D.

Lespedeza, or Japan Clover. By A. D. M'Nair and W. B. Mercier (*U.S.A. Dep. Agr., Farmers' Bull.* 441; May 1911; figs.).—A description of the Japanese Clover (*Lespedeza striata*), with a record of its value as a Hay crop and in permanent pasture and some suggested systems of crop rotation in which it finds a place. *Lespedeza* is a summer annual which does not thrive everywhere, and is only recommended as a Hay crop on the fertile lands of the Lower Mississippi Valley and on certain silt soils. On these last it frequently attains a height of from 12 to 20 inches, and yields from two to four tons to the acre. In other regions it seldom grows more than 4 to 6 inches high, but it is valuable in pastures, and in some districts it has increased the carrying capacity of grazing lands by at least 25 per cent.

It grows on poor or thin soils where other plants do not thrive; it withstands drought and re-seeds itself freely even under severe grazing, so that it is rarely necessary to re-sow it on pasture land.—M. L. H.

Lime-Sulphur Spray, Manufacture and Storage of. By A. J. Patten (*U.S.A. Exp. Stn., Michigan, Circ.* 10; Jan. 1911).—It is stated that in Colorado the continued use of arsenical spray has resulted in many cases in serious injury to the trees, and that the fruit from trees thus sprayed actually shows traces of arsenic, while the fact that soils are being loaded up with poisonous materials in the form of spray solutions suggests the thought that the time will come when the danger and the damage from the excess of arsenic incorporated with the soil may be even greater than the damage due to the insects. These

considerations, and the fact that in many sections of the State lime-sulphur is now the only remedy used against scale insects, and is fast replacing Bordeaux mixture as a summer spray, have recently brought it into great prominence. Experiments have been made to determine the effect of magnesium oxide in the lime, and the conclusion is arrived at that the principal objection to it is the reduction it causes in the amount of calcium oxide in the spray, as it does not affect the amount of sulphur going into solution, if enough of the lime is used to insure the ratio of one part of calcium oxide to two of sulphur being maintained (p. 73). It is suggested that an approximate analysis of the lime to be used should be obtained from the manufacturer, and then such an amount used as will preserve the ratio of one to two. Experiments have been made to determine the effect of storing the lime-sulphur solution in contact with the sediment, and no deterioration has been noticed if properly stored when made according to the formulæ recommended (50-100-50, or 60-125-60), so that there is no advantage to be gained in filtering the solution before storing; but when the solution is made according to a formula calling for an excess of lime, there is considerable deterioration due to the separation of some of the sulphur compounds in the form of crystals (p. 75). The increase in soluble sulphur owing to re-heating before use is not sufficient to pay the cost of the operation. (See JOURNAL R.H.S., vol. xxxvii., p. 262.)—A. P.

Lime-Sulphur Sprays: Methods of Analysis. By J. E. Harris (*U.S.A. Exp. Stn., Michigan, Tech. Bull.* 6; Jan. 1911).—An attempt has been made to modify the analytical methods with the idea of securing greater accuracy and rapidity. The main difference between the methods as described in the bulletin and those in common use lies in the manner of effecting the oxidation of the sulphur compounds and in the estimation of the monosulphide and total sulphide sulphur, and the length of time required to make a complete analysis of a sample of lime-sulphur solution is reduced from more than one day to only a few hours. The manufacture and storage of home-made solutions is also dealt with. (See abstract of Circular No. 10 above.)—A. P.

Locust Destruction in South Africa. By C. W. Howard (*Jour. Econ. Entom.*, vol. iii., pt. iii., pp. 260-271; June 1910).—A very complete account of the work done in South Africa towards the destruction of the two species of locusts (Brown Locust, *Pachytylus sulcicollis*, and the Red-winged Locust, *Cyrtocanthacris septemfasciata* = *Acridium purpuriferum*) which are pests there. Enormous progress in crop-saving has been made and at a cost out of all proportion to the benefits obtained.

Fungus infection has proved of no avail, but spraying strips of grass in the path of the locusts with a mixture of sugar and arsenic has been most effective.—F. J. C.

Meconopsis racemosa. By W. I. (*Gard.*, Oct. 21, 1911, p. 510; fig.).—This beautiful plant has now been in cultivation nearly ten years and is a native of the high Alpine valleys of Western China and Tibet, being found also in the Eastern Himalayas. Some authorities consider it as merely a variety of *M. horridula*, a very small plant with simple flower-scapes found on high elevations, probably not now in cultivation. The stem illustrated in the figure was nearly 2 feet high with a raceme of flowers on rather long pedicels. It first makes a rosette of long narrow lanceolate leaves, clothed with long stiff hairs, while the large flowers vary in colour from deep blue to a light purple. It is a biennial, sometimes flowering in a year from seed, but often goes on for another year before flowering. It is easily grown in a sheltered or shady place, but moisture at the root is essential. Seeds are produced and ripen freely, and during June and July a succession of flowers are borne. Another member of the dwarf section of *Meconopsis* is *M. latifolia*.—*H. R. D.*

Mites in Orchards (*Jour. Econ. Entom.*, iii., 5; pp. 430-434; Oct. 1910).—The red spider, *Tetranychus bimaculatus*, which attacks apples, etc., hibernates in the soil an inch or two beneath the surface, though only a very small proportion of those reaching the soil survive the winter. The pest attacks apple, plum, prune, peach, pear, cherry, and almond, as well as raspberries. Sulphur appears to be the most successful remedy.

Bryobia pratensis attacks the same trees, but does not spin webs. It lays eggs in July, which remain on the trees through the winter. Spraying with the lime-sulphur has proved very effective.—*F. J. C.*

Narcissi (New) (*Gard.*, 1911).—'Miss Maud West' (Leeds), May 20, 1911, p. 238, fig. 236; 'Ornolu' Aug. 19, p. 395; 'Heroine' (Incomp.), p. 397; 'Fair Maiden' (Incomp.), 'Cœur de Lion' (Barri), 'Hamlet' (Trumpet), 'Mermaid' (Giant Leeds), p. 397 and coloured plate; 'White Giant' (White Trumpet), p. 398; 'Golden Jubilee' (Yellow Incomp.), p. 399.—*H. R. D.*

Notes on the Pupation and Hibernation of Tachnid Parasites. By W. R. Thompson (*Jour. Econ. Entom.*, vol. iii., pt. iii., pp. 283-295; June 1910).—An interesting paper on the methods of pupation and the conditions which are best for the proper preservation of the pupæ of certain parasites of caterpillars of economic importance. The paper is also of practical significance in connexion with the sending of parasites long distances in a good state.—*F. J. C.*

Olive, Drought Resistance of the, in the South-Western States. By Silas C. Mason (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 192, Jan. 1911; plates).—In several parts of the arid districts of Southern California and Arizona extensive orchards were planted at one time on the strength of apparently reliable irrigation works.

A series of extra dry seasons, however, occasioned a complete failure of the water supply, and the orchards were eventually abandoned. After six or seven years of complete neglect, the plantations have been visited, and their inspection has brought to light the fact that the olive trees are in every case the only ones which have been able to withstand the long-continued drought with any success. Some fig trees still show feeble growth from below, but grapes, most of the fig trees, apricots, prunes, and cottonwood trees have long since succumbed. An account has also been published elsewhere of a great olive oil industry in a district in the north of Africa, where the rainfall never exceeds 9.3 inches. This bulletin contains an account of the difference in structure between leaves taken from one of these abandoned olive trees and from an orchard at Miles, Cal., where the rainfall is naturally much greater, and where irrigation is also practised. The evidence here presented would seem to indicate that the difference in the conditions under which the plants were grown did have a distinct though comparatively slight effect upon their anatomical structure, but that the normal leaf and stem structure of the olive is such as to protect it admirably against loss of water by transpiration, and thus adapts it to dry soils and climates. Besides this, the root system of the olive shows unusual ability to collect water from soils naturally deficient in moisture, and further, its habit of growth is well calculated to preserve the trunk from the burning heat of the sun. For all these reasons it is believed that with the planting of the African desert-bred variety of olive already referred to, and the adaptation to American conditions of Tunisian methods of planting and culture, large areas of land in the south-western States possessing a suitable soil and climate, but now undeveloped from lack of irrigation water, may be made to produce olive oil.—*M. L. H.*

Onion Seed and Sets, Home Production of. By W. R. Beattie (*U.S.A. Dep. Agr., Farmers' Bull.* 434, March 1911; figs.).—There has been a tendency of late among northern onion growers in America to revert to the original practice of raising their own onion seed, instead of procuring it from large speculative growers. More careful selection is practised in this way, and though all soils and all climates are not suitable to the raising of onion seed, it has been found that carefully grown seed planted in the same general locality in which it was produced will give better results than will seed brought from a distance. This bulletin gives full directions for the raising of onion seed and onion sets, and describes the various fungus diseases and insect pests to which the onion is liable, with the best methods of exterminating them.—*M. L. H.*

Orange Tortrix. By H. J. Quayle (*Jour. Econ. Entom.*, iii., pt. 3, pp. 401-403; Oct. 1910).—This little caterpillar (*Tortrix citrana*, Fernald) feeds on the leaves of oranges, which it rolls or folds, and burrows into the green fruits, appearing to prefer the latter. It attacks

a large number of other plants, a list of which is given. The larvæ generally burrow just through the rind, and the burrows frequently serve as a point of attack for various fungi. The fruit is frequently caused to fall prematurely. The moth lays its eggs on the leaves, and there appear to be several broods during the year. It is recommended that wormy oranges should be picked up and destroyed.—*F. J. C.*

Orchard, Management of a Bearing. By J. G. Moore (*U.S.A. Exp. Stn., Wisconsin, Bull.* 207; April 1911; 14 figs.).—Summer pruning is stated to be a devitalizing process which, if followed for any considerable period, causes a decline in both the vigour and the fruitfulness of the tree, and is not recommended as a general practice. With the climatic conditions of Wisconsin late winter or early spring is preferable to early winter for pruning, as in the latter case the wounds make no progress towards healing till the spring, thus permitting more rapid evaporation from the tissues of the tree and forming shelters for various pests (p. 18). It is recommended to prune mature trees annually instead of at intervals of several years, as the latter method induces a vigorous and vegetative growth which runs largely to the production of watery spray, and so upsets the balanced growth of the tree (p. 22). The three worst pests in the orchards of this State are the weevil, the codling moth, and the apple scab (p. 26).
A. P.

Orchard, Notes on a Dry Land. By J. E. Payne (*U.S.A. Exp. Stn., Colorado, Bull.* 173; Nov. 1910; 2 plates).—Details are given of the root-systems and general development of trees planted at different depths. Deep planting did not decrease the rate of growth nor alter materially the position of the feeding roots.—*A. P.*

Orchard, Planting the Commercial. By J. G. Moore (*U.S.A. Exp. Stn., Wisconsin, Bull.* 201; Feb. 1911; 15 figs.).—Wisconsin is expected to become a great apple-producing State, though its severe winter has been against commercial apple-planting in the past. The writer maintains that there are many districts where the climatic conditions are as favourable to the production of adapted varieties as in many of the famous apple regions, and discusses in considerable detail the routine operation in planting a commercial orchard. He lays stress on the advisability of planting in the early spring rather than in the autumn, so as to avoid the winter-killing of the trees (p. 24); of withholding manure from newly-planted trees, on the ground that it delays the early development of an extensive root system (p. 29); and of selecting only two or three varieties that are known to be specially adapted to their future environment (p. 34). 'Wealthy' and 'Duchess' are the two varieties most successfully grown in this State, very high grade fruit of these being produced, and it is pointed out that even in the great apple-growing districts of the West each has two or three varieties, or even only one, which can be grown successfully.—*A. P.*

Orchards, Suggestions on Planting. By O. R. White (*U.S.A. Exp. Stn., Mich., Bull.* 262; July 1910).—One of the suggestions is that it would be to the advantage of the orchardist if he furnished the nurseryman with scions or buds secured from trees of known productiveness, hardiness, and health (p. 10).—A. P.

***Oxalis adenophylla*.** By W. I. (*Gard.*, July 29, 1911, p. 358).—Has glaucous foliage similar to *O. enneaphylla* from the Falkland Islands, but the leaflets are more numerous and the rootstock is large and bulbous, covered with a strong fibrous coat; the flowers are borne two and three on each peduncle and are of a rosy-pink with deeper lines and a purple base. It was collected near San Martin, in Chile, by Mr. H. J. Elwes, growing at an elevation of 6,000 feet, and it first flowered at Kew in May 1905. With a slight covering of bracken it came through the winter all right and appears to be hardy. It is dwarf.
H. R. D.

Paris Dahlias. By Hortulus (*Le Jard.*, xxv., 573, p. 7; Jan. 5, 1911; coloured plate).—A useful note on the race of Striped Dahlias introduced by MM. Millet et fils; twenty-eight varieties are enumerated, all distinguished as regards nomenclature by the name of the buildings in Paris, e.g. Tour Eiffel, Trocadéro, Panthéon, Métro, and Tuileries, which are figured in the plate.—F. A. W.

Peaches, Spraying for Brown-rot. By C. A. McCue (*Trans. Peninsular Hort. Soc., U.S.A.*, pp. 48-53; 1911).—A four-year-old orchard of Champion peach was sprayed three times in the season of 1910 with various fungicides, and the best results followed the use of self-boiled lime-sulphur spray, and a solution of commercial lime-sulphur diluted 1 to 50. The latter, however, is not recommended, as it is always dangerous, and the foliage of the peach is extremely fickle. The writer thinks that the ideal fungicide will be found when some way is discovered of obtaining sulphur in an extremely finely divided state, and atomic sulphur, which gave some good results in the experiments, seems to be a good step in that direction. It is a preparation of arsenate of lead and self-boiled lime-sulphur, that is made with no more heat than that afforded by the slaking of the lime. The use of lime-sulphur is further dealt with on pages 54 to 61 of the same publication.—A. P.

Plum-rust, Life-History of. By E. F. Brooks, M.A. (*New Phytologist*, x., p. 207; May 1911).—It is shown that the fungus *Accidium punctatum*, which attacks the anemone, especially *Anemone coronaria*, is a stage in the life-history of the plum-rust, *Puccinia pruni*, in England, as it is in America, where it occurs on *Hepatica acutiloba*, and in Russia. Destruction of affected plants of *Anemone coronaria* would be of assistance in checking the attack on the plum.

F. J. C.

Plum Weevil. By F. L. Washburn (*U.S.A. Exp. Stn., Minnesota, 17th Ann. Rept.* 1909; pp. 234-237; figs.).—Spraying plum-trees with arsenate of lead and Bordeaux mixture two or three times at the beginning of the season when the weevils appear (once before and once just after flowering) reduced the loss by at least 50 per cent., while experiments have shown that the attack on the apple may be similarly controlled and the codling-moth dealt with at the same time. Cultivation during July and August and turning hogs in to feed on windfalls were found of great value.—*F. J. C.*

Potato-growing in Minnesota. By A. R. Kohler (*U.S.A. Exp. Stn., Minnesota, 17th Ann. Rept.* 1909; pp. 285-362).—A variety of experiments with potatoes have been in progress in Minnesota for many years, and some important results are detailed in the present Bulletin. One hundred varieties were tried side by side, and descriptions and notes of sixty-three of these are given, followed by a tentative system of classification of the potato varieties, based on the characteristics of the haulms, the shape of the tubers, and the colour of the tubers. The main groups proposed are—

I. *Tuberosum Group*, so called on account of the foliage of the varieties comprising it being similar to a strain of *Solanum tuberosum* obtained from Mexico.

II. *Rural Group*, the type of which is the 'Rural New Yorker No. 2.'

III. *Endurance Group*, with typically enduring foliage, 'Endurance' being the type.

IV. *Seedling B. Group*, including 'Factor' and 'Radium'—a tentative group.

V. *Green Mountain Group*, named from the type variety.

VI. *Carman Group*, including 'Snowball.'

VII. *Early Michigan Group*.

VIII. *Milwaukee Group*.

IX. *Russet Group*.

X. *Ohio Group*, with 'Early Ohio' as the typical variety.

XI. *Early Market Group*.

Full descriptions of these suggested groups and their characteristic behaviour are given in the Bulletin.

A comparison was made between newly imported and old stocks of several varieties, and in practically every case the yield and growth obtained with the former were greatly better than those obtained with the latter, just as in England.—*F. J. C.*

Potato-spraying. By A. R. Kohler (*U.S.A. Exp. Stn., Minnesota, 17th Ann. Rept.* 1909; p. 327).—Discusses the good effect of spraying with Bordeaux mixture (from one to six times) upon the crop, and the freedom from disease.—*F. J. C.*

Potatos. By T. S. Parsons (*U.S.A. Exp. Stn., Wyoming, Bull.* 86, Jan. 1911; plates).—Hints on the culture and management of potatos as a field crop in Wyoming, on the most suitable varieties to grow there, on the control of diseases, on harvesting and storing. Small potatos are not recommended for planting. Large tubers of good shape are said to be the best for seed.—*M. L. H.*

Potatos affected with "brown-rot" as seed. By A. R. Kohler (*U.S.A. Exp. Stn., Minnesota, 17th Ann. Rept.* 1909; p. 324).—This disease, which either causes browning of the tubers, spreading from the vascular bundles to the flesh, but often not noticeable from the outside, or produces brown spots on the surface of the tuber, is attributed to an undetermined species of *Fusarium*. Sets affected were used as seed, with the result that slight attack reduced the yield, while bad attacks gave only about 25 per cent. of the yield from unaffected tubers.—*F. J. C.*

Primula sinensis, Experiments with. By R. P. Gregory, M.A. (*Jour. Gen.*, i., 2; pp. 73-132; March 1911; plates).—The inheritance of a variety of characters in *Primula sinensis* is discussed, and the results of experiments are detailed. The principal objects of investigation have been the inheritance of heterostylism and of colour. Short-styled forms are dominant to long-styled, but for some reason not yet determined, when heterozygous short-styled forms are self-fertilized there is always a dearth of short-styled plants among the offspring. The palmate type of leaf is dominant to the fern-leaf type, while the 'ivy-leaf type,' in which the palmate leaf margin is not crenate, is recessive to the normal. The ordinary form of doubleness in the flower is recessive to singleness. Eye-characters appear to be inherited quite independently of any other character, but the presence or absence of certain forms of eye may affect the colour of the rest of the flower. The inheritance of stem colours and flower colours is discussed at length, but for details reference must be made to the paper.—*F. J. C.*

Propagation (Seedling Inarch and Nurse-plant), Methods of. By George W. Oliver (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 202, March 1911; plates).—An account of a new system of propagation by inarching—a method which may be used to hasten development of new seedling varieties, as a cheap and easy method of producing stock, or, in the case of the mangosteen for instance, to help in tiding young seedlings over a rather critical stage of their growth. The operation is accurately described in all its forms—inarching seedling plants on the stems of large ones, inarching twigs of woody plants on to seedlings, and inarching sickly seedlings on to other seedlings of more vigorous habit. Careful directions are given, and good illustrations make everything clear. It is contended that stock may easily be raised in this way in large quantities with the expenditure only of reasonable care and without any special skill.—*M. L. H.*

Raspberry Industry, The Colorado. By R. S. Herrick and E. R. Bennett (*U.S.A. Exp. Stn., Colorado, Bull.* 171, Nov. 1911; figs.).—Raspberry growing has become an important industry in several districts of Colorado, and will probably increase in future, the conditions being very favourable. This bulletin gives an account of the requirements of the plant, full cultural directions, advice in propagation, pruning and harvesting, and on the best varieties of the three sorts of raspberry—red, blackcap, and purple cane—for market purposes in Colorado. A descriptive list is added of the diseases to which the canes are liable, with the appropriate treatment for each.

M. L. H.

Rhododendron occidentale (*Die Gart.*, Nov. 25, 1911, pp. 650).—Hardy deciduous species from North America, with handsome pure white flowers, and very sweet-scented. It will thrive well, both in sunny and shady positions, as long as it is kept moist.—G. R.

Rhododendron rosmarinifolium (*Die Gart.*, Dec. 1911).—Hardy in the north of Europe, and, like *R. occidentale*, deciduous, flowering very freely during the spring for several weeks.—G. R.

Richardias (Double Hybrid). By C. Platel (*Le Jard.*, xxv., 586, p. 220; July 20, 1911; 2 figs.).—The author is endeavouring to establish a race of double Arums by crossing *Richardia devoniensis* and 'Perle de Stuttgart,' and has been successful in a large number of cases. He obtains pure white double spathes, the outer one being very large, with a fine yellow spadix. As they now come true from seed, he hopes that the type is established.—F. A. W.

Roses (New) (*Gard.*, 1911).—'Mrs. George Shawyer' (May 27, 1911, p. 248); 'Portia' (June 3, 1911, p. 261); 'Marguerite Guillot' (June 10, 1911, p. 272); 'Frances Charteris Seton' H. T. (July 29, 1911, p. 356); 'Herisson' H. T. (Aug. 5, p. 369); 'Duchess of Wellington' H. T. (Nov. 4, 1911, pp. 532, 533); 'W. R. Smith' T. (Nov. 11, 1911, p. 544).—H. R. D.

Roses, The Parentage of. By R. Daniels (*Gard.*, 1911). Lists of Roses with their parentage will be found in the following numbers:—May 13, p. 231; May 20, p. 243; May 27, p. 254; June 3, p. 266; June 10, p. 278; June 17, p. 290; July 1, p. 314; July 8, p. 326; July 15, p. 338; July 22, p. 350; July 29, p. 362; Aug. 5, p. 374; Aug. 12, p. 386; Aug. 19, p. 404.—H. R. D.

Silver-leaf Disease. By D. Houston (*Gard.*, Jan. 16, 1911, p. 16).—Silver-leaf is a disease which occurs in many trees, but notably in stone fruits, and is becoming more and more prevalent. Its chief characteristic is a whitish or silvery appearance of the foliage. At first the disease has little effect upon growth or fruitfulness, but after

a few years the branch affected dies, and the silvery of the foliage extends to other parts, until the tree is killed outright. The cause was long unknown, but in 1902 Professor Percival showed by inoculation experiments that it was due to the attack of a fairly common fungus *Stereum purpureum*, which usually fructifies in fallen trunks of trees, especially poplars. Although it will grow on from year to year in the tissues of a plant, it will never fruit until the wood of the host is dead, but once the branch dies then, *and not till then*, it will produce spores. When the silver-leaf disease brings about the death of a branch tiny patches of fungoid growth appear on the surface of the bark, and growing bigger gradually assume a purplish colour, though it is occasionally white and pallid-looking, and takes the form of a leathery earlike flap with wavy margins. Several of these arise together, forming a stratified cluster; the upper surface carries an enormous number of spores. To prevent the formation of these spores should be the primary care of fruit growers. It has been shown at Woburn that a living branch cannot transmit the disease. All wood should therefore be removed and burnt as soon as it ceases to be alive. But it is better to remove the whole branch as soon as silver-leaf appears, burn it, and cover the cut surface with tar. There is no hope of the branch getting rid of the disease, and no fungicides are of any use.

H. R. D.

Soda, Nitrate of, in Horticulture. By Dr. A. Monnier (*Jour. Soc. Nat. Hort. Fr.*, series iv., vol. xii., July 1911, p. 371).—The conditions under which the nitrates, so necessary a part of plant food, are produced do not always exist in the soil. For nitrification to take place the soil must be permeable to air, must contain a certain amount of moisture, and must be at a temperature of from $+12^{\circ}$ Cent. to $+37^{\circ}$. It often happens in spring that the soil is not yet at the temperature at which nitrification takes place, and young plants suffer in consequence. At this moment it is indispensable to provide azotic manure in some soluble and directly assimilable form, and of these forms nitrate of soda is specially to be recommended, on account of the rapidity of its effect. In horticulture it has not yet been sufficiently appreciated, but it must be used with caution, as, according to the quantity used, this substance becomes a food, a stimulant, or a poison. The following are the different formulæ suitable for different purposes:—

For foliage plants in groups:—

Nitrate of soda	50 grammes.
Superphosphate of lime (12-14 per cent.)	75 „
Potassium chloride (per square metre) .	15 „

For flowering plants in groups:—

Nitrate of soda	25 „
Superphosphate of lime (12-14 per cent.)	125 „
Potassium chloride (per square metre) .	25 „

For plants in pots weak solutions may be used in doses of not more than one gramme or one and a half grammes to the litre of water. Water plants in the sun every ten days, and plants in the shade once a month. Nitrate of soda is recommended for lawns, applied at the rate of ten grammes to the square metre every month, from the month of April.—*M. L. H.*

Sodium Cyanide for Fumigation Purposes, Value of. By R. S. Woglum (*Jour. Econ. Entom.*, iii., pt. i., pp. 85-88; Feb. 1910).—Experiments show that a high grade sodium cyanide is as effective in fumigating against insect pests as a high grade potassium cyanide. As a given weight of high grade sodium cyanide produces more gas than a high grade potassium cyanide ($1\frac{1}{2}$ —1) and its price per lb. is the same, the former is the cheaper. The presence of sodium chloride in the cyanide is detrimental to its use for fumigation purposes, and a sample containing over 1 per cent. of sodium chloride should be rejected.—*F. J. C.*

Soil Physics, Studies of. By W. Heber Green and G. A. Ampt (*Jour. Agr. Sci.*, iv., pt. 1; pp. 1-24; May 1911).—A highly technical paper dealing with the important questions of permeability and capillarity in soils. The authors define the constants of these two properties and measure the movements of air and water through three types of soil. They regard these measurements as of greater importance than the determination of the size of the soil particles as made in ordinary mechanical analysis, and consider that the latter should be replaced by the former. The soils used in the experiments were not natural soils *in situ*, but were soils in the condition usually sent for analysis.

F. J. C.

Soil, Storing Moisture in the. By W. W. Burr (*U.S.A. Exp. Stn., Nebraska, Bull.* 114; May 1910; 13 charts, 4 figs.).—The west of this State frequently suffers from insufficient rainfall, and it is believed that some modification of the system of alternate cropping and summer tilling, as practised in the dry-farming regions of the Western States will prove the solution of the problem of profitable crop-production. Soils have been sampled to a depth of fifteen feet, and the writer thinks that the water content of the lower soil is affected by cultivation and cropping to at least that depth (p. 14).—*A. P.*

Soils, The Development of Marsh. By A. R. Whitson and F. J. Sievers (*U.S.A. Exp. Stn., Wisconsin, Bull.* 205; Feb. 1911; 7 figs.).—There are nearly three million acres of marshes in this State, and, though some of them are as much as fifty thousand acres or more in extent, this kind of land is so widely distributed that thousands of farms contain a small area of it. The rising prices of farm lands make it desirable to develop these lands to the greatest possible extent. It is essential to recognize that important differences exist in the character of these marsh soils, mainly owing to the

differences in the underlying rocks and the nature of the climate, and the writers deal with the methods of drainage, cultivation, manuring, and general treatment necessary for the most important classes of marsh lands, together with the crops most suitable for each.—A. P.

Soils, The Improvement of Sandy. By A. R. Whitson and F. J. Sievers (*U.S.A. Exp. Stn., Wisconsin, Bull.* 204; Feb. 1911; 5 figs.).—There are between four and five million acres of sandy lands in Wisconsin, and they are now being rapidly cleared and developed. Soil inoculation has been found desirable, for though, ordinarily, medium red or alsike clover develops nodules in abundance, alfalfa and many other legumes often fail to do so, or do so only to a very slight extent, until they have been grown on the same piece of ground for three or four years. Artificial cultures as advertised have not given such good results as inoculated soil, and, where haulage is costly, it is recommended to use a little inoculated soil on a small plot of ground on which the corresponding crop can be grown for two or three years until it has become thoroughly inoculated, when it can be used for applying to land which is in need of it (p. 12). The bulletin deals pretty fully with the needs of these very sandy soils, and the best means of bringing them into a state of fertility.—A. P.

Soils, The Management of Heavy Clay. By A. R. Whitson and E. J. Welwiehe (*U.S.A. Exp. Stn., Wisconsin, Bull.* 202; Feb. 1911; 5 figs.).—The methods of treatment recommended are chiefly based on the results of studies during five years on wet clay soils, where in the natural state no true grass grows, but sedges form the greater part of the vegetation! As the organisms which are active in producing fertility and the vegetable matter upon which they act are mainly confined to an inch or two of the surface-soil, the first ploughing of new soil should be rather shallow, being deepened afterwards an inch or so each year.—A. P.

Soot, Character and Composition. By J. B. Cohen and A. G. Preston (*Jour. Soc. Chem. Ind.*, vol. xxx., No. 23, pp. 1360-4; 7 tab.).—This article gives particulars of various experiments and investigations showing the variations in composition, due to the different conditions of production and kinds of coal and other fuel; also the effects of soot-laden atmosphere upon vegetation.

The importance of variation in composition will be realized by the figures of the author based on the unit value of nitrogen, giving a range of from 24s. to £5 the ton for different samples. Soots from chimneys with a strong draft are found to yield very heavy percentages of ash, especially from the lower portions of such chimneys, while the percentage of nitrogen in such cases is low. On the whole the products from short chimneys are far superior as fertilizers to those from tall chimneys.

Tables are given showing the variations in composition from both factory and domestic chimneys of varying heights and from different

portions of such chimneys. The author suggests that soot should be purchased by measure rather than by weight, as the lighter samples are the richer, and the valuation varies inversely with the weight. He points out also that where bought by weight four bushels should be expected to the hundredweight, this being the minimum measure with good domestic soot.

Estimations are made of the amount of soot present in the atmosphere of Leeds, as representing a manufacturing town, and it was shown that the atmospheric content over the whole of Leeds would correspond to some 220 tons for each square mile per annum, varying from 25 tons in one of the residential portions of the town to 539 in one of the industrial portions.

There is also pointed out the effect of this material in the atmosphere upon the sunlight, 17 per cent. more sunshine and 40 per cent. more intensity of light being recorded at a point four miles outside the town as compared with the centre.

These facts are applied to the growth and development of plants in various parts of Leeds, some figures being given showing the variations in carbon-dioxide assimilation. Amongst the plants watched it was found that in comparison with laurels growing in a residential part, those in the polluted areas were stunted in size, and in the worst districts were non-existent.

An examination of the samples of soot indicated presence of mineral acids to the extent, in certain parts, of as much as 80 lb. per acre (presumably per annum).

Ash trees were shown to retain their leaves six weeks longer in the purer parts of Leeds than in the more contaminated districts.

Its effect upon crops is referred to, showing that the yields over a given area of radishes and lettuces in one of the contaminated districts were only from one-quarter to one-half that obtained under the better conditions further out.

Particulars are also given of some experiments made to estimate the deposit of tar amongst the soot, such tar of course choking up the stomata on the leaves with bad effect. The annual deposit of tar for each square mile was shown to vary from $4\frac{1}{2}$ cwt. to 110 cwt., the lower figure being in a residential part, and the higher figure in an industrial one.—W. A. V.

"Sooty Blotch," A new fungus disease of Apples. By E. S. Salmon (*Gard. Chron.*, xlviii., p. 443; Dec. 17, 1910; 2 figs.).—The cause of "sooty blotch" is said by the writer to be a species of *Leptothyrium* not previously recorded for this country. The blotches, which are more or less rounded, one-fifth of an inch or less in diameter, are composed of the straggling hyphæ of the fungus. On the same apples minute black spots were found. This condition is known as "fly-speck" in America. In Professor Duggar's book "sooty blotch" and "fly-speck" are ascribed to the same cause, viz., *Leptothyrium*, but F. L. Stevens and J. G. Hall ascribe

"sooty blotch" to the fungus *Phyllachora pomigena*, and "fly-speck" to *Leptothyrium pomigenum*. No additional evidence as to the identity of the two diseases is given by the writer in the present article.

The disease is likely to prove troublesome by damaging the look of well-grown apples, and thereby interfering with the practice of marketing the best apples in boxes.

Systematic spraying with Bordeaux mixture is recommended except on Cox's Orange Pippin and Duchess's Favourite.—A. S. H.

Sprays, Summer, on Apples and Peaches. By G. P. Clinton and W. E. Britton (*U.S.A. Exp. Stn., Conn., pt. vii. Biennial Rep. 1909-10*; 8 plates).—Owing to serious injury from the use of Bordeaux mixture experiments were undertaken to compare it with lime-sulphur preparations, both as regards fungicidal value and immunity from spray injury. With the commercial and self-boiled lime-sulphur sprays there was no leaf injury worth mentioning, but with Bordeaux the leaves suffered more or less serious spotting and leaf fall, while with the commercial lime-sulphur sprays containing other ingredients in addition considerable damage resulted in some cases. As regards the fruit, the russetting resulting from the use of commercial lime-sulphur sprays was never so general or so conspicuous as from Bordeaux (p. 598). The results of the tests with the spraying of peaches lead the writer to recommend self-boiled lime-sulphur as the best summer fungicide for general use, but it should never be used later than the middle of July, and in dry seasons not so late as this, on account of the sediment that may adhere to the fruit at market time (p. 617).

A. P.

Superparasitism: An Important Factor in the Natural Control of Insects. By W. F. Fiske (*Jour. Econ. Entom.*, vol. iii., pt. i.; pp. 88-89; Feb. 1910).—"Superparasitism results when any individual host is attacked by two or more species of primary parasites, or by one species more than once." Instances of superparasitism are quoted, especially some met with in the breeding of gipsy-moth parasites in the attempt to control this pest by their means. The author points out that superparasitism frequently nullifies the work of the parasite and distinguishes three classes of manifestations:

- (1) One parasite lives; the other dies.
 - (a) The survivor preys upon the other as an accidental secondary parasite. Of common occurrence.
 - (b) The survivor destroys the other by bringing about premature death of host, and may or may not devour it incidentally. Of common occurrence.
- (2) Both parasites live.
 - (c) Neither is the worse for the circumstances. Very rare.
 - (d) One or both are so weakened and stunted as to bring about a material reduction in their capacity for reproduction. Common.

(3) Neither parasite survives.

(e) This may be brought about through premature death of host through excessive parasitism (commonly); or

(f) Through inability of either parasite to complete its transformations on the limited supply of food. Common.

The prevalence of superparasitism depends on whether the female parasite is gifted with a prescience which will enable her to select healthy hosts for her offspring.

The author considers the question of great economic importance in dealing with parasitism as a means of controlling insect pests.—F. J. C.

Tobacco Culture in Wisconsin. By J. Johnson (*U.S.A. Agr. Exp. Stn., Wisconsin, Bull.* 206, April 1911; plates).—This bulletin gives the history and statistics of the industry in the State of Wisconsin, points out in which parts of the State the soil is most suitable to the crop, gives full instructions for preparing the beds for raising the seedlings, and for the subsequent cultivation of the crop, and a full account of the processes of harvesting and curing. It ends with a list of the varieties which are most suitable to the climate, and other conditions in Wisconsin.—M. L. H.

Tree pests, Some destructive shade. By F. L. Washburn (*U.S.A. Exp. Stn., Minnesota, 17th Ann. Rept.* 1909; pp. 165-195; figs.).—A number of insects injurious to ornamental trees are described and figured, and appropriate methods of control are detailed. The insects alluded to are the oak pruner (*Elaphidion villosum*, Fabr.); two ash borers (*Podesesia (Aegeria) fraxini*, Lugger, and *Papaipenna furcata*); the locust borer (*Cyrtene robiniae*, Forst.); the box elder maple borer (*Proteoteras aesculani*, Riley); the bronze birch borer (*Agrilus anxius*, Gory); the pine bark aphid (*Chermes pinicortis*, Fitch); alder aphid (*Pemphigus tessellatus*, Fitch); the cottony maple scale (*Pulvinaria innumerabilis*, Rath.); fall web worm (*Hyphantria cunea*, Dru.); the poplar leaf beetle (*Melastoma scripta*, Fab.); "Curtis" scale (*Aspidiotus ostreaeformis*); the scurfy scale (*Chinoaspis furfura*, Fitch); the white marked tussock moth (*Heterocampa leucostigma*, Sm. and Abb.); the forest tent caterpillar (*Melacosoma dissitria*, Hubn.); willow saw flies (*Cimbex americana*, Leach, and *Pteronotus ventralis*, Say); the elm caterpillar (*Euvanessa antiopa*, Linn.); the elm leaf beetle (*Galerucella luteola*, Mull.).—F. J. C.

Vegetation, Natural, as an indicator of the capabilities of land for crop production in the Great Plains area. By H. L. Shantz (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 201; March 1911).—Any attempt at arriving at the crop-producing capacities of new land by examining the character of its native vegetation is almost certain to lead to error if any single plant is taken as necessarily proving the existence of any special characteristic of soil or climate. So many things go to make up the sum of what a plant requires or will stand, the proportion or balance between all of these is often of so much more

importance than the presence of any particular one among them, and there are so many influences crossing and neutralizing each other in the life-history of any plant, that botanists are not agreed as to which is the factor of greatest importance in controlling plant distribution.

This paper tries to show how land may be classified with reasonable accuracy by studying its natural vegetation as a whole and in relation to all the local conditions.

Natural vegetation is not only an expression of the present conditions, but to some extent a record of conditions that have obtained during a period of many years. In the character of the whole plant cover, therefore, we have a record as stable as the most stable species and as sensitive as the most exacting plant, and it is pointed out that, as far as the conditions of growth are concerned, many native American plants are far more exacting than the cultivated crop plants. The investigations carried on on these lines at several places in the Great Plains are here carefully described.

The various groups or "associations" of plants were carefully classified and recorded as belonging to the area in which they occurred, and such physical data as soil-moisture, rain-fall, run-off, water-penetration, and water-loss, and such disturbing factors as ploughing, grazing, fires, parasitic fungi, etc., were noted in connexion with their presence. The relations of such physical conditions to their accompanying orders of plant-life were considered, and general conclusions were drawn as to the probable adaptability of the districts under observation to certain cultivated crops.—*M. L. H.*

CORRIGENDA.

Pp. 127, 129. The *Table* of weather records for April is printed under March on p. 127; that for March under April on p. 129. These *Tables* (only) should be transposed.

P. 135, line 13, for 50° read 5°.

P. 394. The last sentence of the introduction to the Sweet Pea Report has been transposed from its position five lines earlier. The report should read (commencing line 8): "Several varieties were also commended on account of their strong growth, and because of their non-burning qualities. They are indicated by the sign **P** below. These varieties" . . . etc.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

JANUARY 3, 1911.

Sir TREVOR LAWRENCE, Bart., K.C.V.O., V.M.H., in the Chair.

Fellows elected (20).—Mrs. W. Addinsell, T. Aley, Miss A. d'O. Boswell, Miss M. K. Bubb, H. Buckton, Mrs. F. E. Collingwood, H. E. de Pury, Miss A. E. Gairdner, S. B. Gorringer, Miss H. Hale, Lieutenant-Colonel E. H. Joynt, Mrs. H. Leaf, H. F. Longfield, Mrs. J. C. Lovell, J. Mallender, H. H. S. Northcote, Miss K. Pakenham, Miss Richards, T. D. Ronaldson, H. J. Southgate.

GENERAL MEETING.

JANUARY 17, 1911.

Dr. A. B. RENDLE, F.R.S., F.L.S., in the Chair.

Fellows elected (63).—Major J. Addison, Mrs. M. Aird, Miss M. Bence-Jones, R. L. Brazier, Miss M. E. Britton, C. H. Brannam, R. Chidley, Miss A. B. Clark, Mrs. A. Cook, G. Corbett, G. G. Davidson, J. C. Fagg, F. H. Farthing, Lady Fortescue Flannery, H. M. Fletcher, W. Fox, J. H. Greener, W. H. Griffiths, A. F. Harland, C. G. B. Hotham, Miss M. Langley, F. Lansdell, E. J. Lascelles, Mrs. C. Lawrance, T. Lewis, Miss A. Lott, D. Mackelvie, Mrs. K. Mainwaring, E. Manisty, Miss Mason, Lady Dorothy Meynell, Colonel A. W. Money, J. Montgomery, Lieutenant-Colonel A. G. Nugee, Captain G. B. Ollivant, J. Perry, E. Phillips, H. Pullman, A. W. Reading, Lady Rowley, Miss A. H. Ruddock, J. H. Runchman, Miss F. Russell, T. J. Saunders, A. L. Scott, A. M. Seligman, Miss E. Silvester, Mrs. A. L. Sinclair, Dr. C. Slater, Richard Smith, Mrs. L. G. Spratt, J. M. Stewart, S. Stewart, Mrs. F. W. Thoyts, N. P. Tod, Major Tredgold, Mrs. Tredgold, A. Turner, Mrs. C. Underwood, C. Wagstaff, Mrs. H. Webb, A. J. Weber, Mrs. E. Woodhouse.

Fellows resident abroad (2).—F. J. Nutter (Costa Rica), Lieutenant-Colonel C. F. Call (France).

Societies affiliated (4).—North of England Horticultural Society, The Towers (Queensland) Horticultural Society, United Kingdom Commercial Travellers' Association (Bristol Branch), Worplesdon District Horticultural Society.

A lecture on "Weeds and Weed Seedlings" was given by Mr. Harold Long (see p. 26).

GENERAL MEETING.

JANUARY 31, 1911.

Mr. GEORGE GORDON, V.M.H., in the Chair.

Fellows elected (78).—Mrs. A. G. Anderson, F. C. Bennett, Mrs. H. Bishop, Miss Bogle-French, C. Bonnick, Lady Bousfield, Colonel Hon. J. Pleydell Bouverie, J. L. Boyson, Miss H. Burrows, H. C. Carruthers, Mrs. R. Catchpole, E. C. Chivers, T. Clark, Jeremiah Colman, J.P., Mrs. E. Darlington, Mrs. E. Pelham Dashwood, F. E. Dillistone, Sir John Duncan, W. T. Edwards, Miss E. E. Eggar, J. T. Ellis, H. R. Erhardt, Marten L. Evans, Mrs. E. Higgon Evans, G. Fenoulhet, H. Fink, E. H. Freeman, Miss D. Furze, Hamilton Gepp, E. Gorer, Mrs. H. Grimwood, A. Hallam, A. F. Hardy, W. O. Hieble, W. Hobby, Mrs. Jefferson Hogg, Mrs. E. Holt, Miss E. D. H. Hosack, Mrs. Jenkinson, Mrs. H. Keith, Mrs. C. de Lacy Lacy, Dr. G. R. Lake, Rev. Canon Lovett-Cameron, G. Lund, G. S. Lysaght, G. MacLennan, Mrs. C. Magrath, Mrs. J. Marsden, Mrs. Massie, Miss E. M. Mellersh, Mrs. Miles Miley, G. J. Miller, Rev. J. S. Müller, M.A., R. Page, Miss J. Lennox Peel, Mrs. E. Powell, Mrs. Priestley, Mrs. Roper-Caldwell, Mrs. G. Roupell, C. Stanford, Mrs. J. H. Savory, A. M. Sharratt, F. Shelley, Mrs. S. Ford Simpson, Mrs. C. Sims, Miss D. Skarratt, Mrs. J. J. Snook, F. R. Spelman, Mrs. Toulmin-Rothe, J. G. Tytler, Mrs. von Braun, A. E. Wakeford, Mrs. Waller, E. L. Waring, Mrs. E. M. Weatherley, Walter Webb, A. T. Webster, Mrs. Lionel Wilson.

Fellows resident abroad (4).—E. A. Delanone (Paris), Henry Kerr (Auckland, N.Z.), Y. Okura (Tokyo), F. E. Pearson (Auckland, N.Z.).

Associates (12).—Miss D. Cary, Miss H. Garlick, Miss S. Gibson, Miss R. Hopkins, Miss C. Hughes, Miss A. W. Hutchinson, Miss L. Jenkins, Miss J. Kitchen, Miss H. Nation, Miss I. Sutton, Miss M. Thomson, C. F. Wood.

Societies affiliated (2).—Chichester and West Sussex Horticultural Society, Scarborough Allotment Holders' Association.

A lecture on "Colour Photography" was given by Mr. W. Marshall.

ANNUAL GENERAL MEETING.

FEBRUARY 14, 1911.

Sir TREVOR LAWRENCE, Bart., K.C.V.O., V.M.H., in the Chair.

Fellows elected (90).—W. Acworth, E. J. Anderson, Mrs. G. Armitage, H. R. Arnold, Mrs. G. T. Atkinson, Mrs. M. H. Baker, Miss F. A. Batty, H. Baxter, Mrs. H. F. Baxter, Henry Beer, Mrs. C. F. Bell, Mrs. C. Bethell, Mrs. R. P. Birch, Mrs. H. Booth, Mrs. Borland, Miss L. Bray, Mrs. H. W. Brett, Colonel W. H. Broun, A. Charlton, Miss E. Corbould-Warren, G. Corderoy, Miss Crawhall, W. C. Davis, Mrs. H. de Kantzow, Mrs. Dinwiddy, Mrs. Douglas-Cow, Mrs. O. F. Dowson, Mrs. J. L. Duforest, Hon. M. W. Elphinstone, Mrs. Ewen, Mrs. C. Fitz-Clarence, Mrs. Banister Fletcher, Mrs. J. Gilmour, C. B. W. Goody, Mrs. J. Groves, G. H. Harrison, J.P., T. Heynes, Rev. F. H. Higley, Miss Homfray, Mrs. F. L. Horne, C. H. Hough, Mrs. Jarmay, Miss R. J. W. Jervis, Mrs. F. H. T. Jervoise, Mrs. Johnston, R. B. Ker, Mrs. E. Lascelles, Mrs. P. D. Lee, Mrs. Levien, H. Lloyd, Miss V. D. Lofis, C. Macdonald, Mrs. D. McGill, Hon. J. W. Mansfield, L. Marshall, A. W. Matton, Mrs. G. W. Milner, Mrs. Neline Nalder (Lydia Chatterton), Miss Meresia Nevill, Miss Newton, W. Nutting, Mrs. S. Oppenheim, W. L. Orgill, Miss L. V. Outram, Miss L. S. Owen, S. Oxley, W. E. Palmer, Mrs. J. Conbro Potter, J. R. Pulham, Mrs. A. Richards, L. Rosenfeld, H. G. Rowley, H. Salvin, Mrs. E. H. Selby, E. P. Sells, Colonel Sheldrake, Mrs. A. T. Sidey, Mrs. W. C. Slaughter, D. Spence, Mrs. C. Spensley, L. Stonard, Archdeacon Taylor, Mrs. T. Frame Thomson, J. Vaughan, Mrs. A. F. Vigers, Mrs. C. Hay Walker, Miss C. I. Ward, P. D. Warren, C.M.G., T. R. Westray, Miss H. Yorke.

Fellows resident abroad (5).—Miss S. Ascher (Germany), H. D. Chatterjee (Calcutta), A. O. Loten (Argentina), C. Marlow (Guernsey), P. B. Snashall (Rhodesia).

Associates (6).—Miss M. Bainbrigge, W. Balmforth, W. B. Burgess, B.Sc., Miss G. H. Cross, Miss M. E. Edmonds, M. Hunter.

Societies affiliated (6).—Aldborough Hatch Horticultural Society, Dynas Powis Horticultural Society, Hawkes Bay (N.Z.) Agricultural Society, Malmesbury Agricultural and Horticultural Society, Uttoxeter Agricultural Society, Whitchurch (Cardiff) Horticultural Society.

The President moved the adoption of the Annual Report, coupling with it a special vote of thanks to Mary, Countess of Ilchester, for her hospitality to the Society in 1910 and in several preceding years. This was seconded by the Treasurer and carried.

Mr. H. J. Elwes, F.R.S., asked the Council to consider the advisability of recommencing the issue of the Quarto Transactions, of which ten volumes were published from 1807 to 1845. He said he personally knew of a large number of highly valuable scientific papers

which were only waiting for such a publication, and he was sure that a very large number of Fellows would gladly contribute an additional £1 1s. a year for such Transactions. This was seconded by the Rev. G. H. Engleheart, and the President undertook that the matter should receive careful consideration by the Council.

The following names of President, Vice-Presidents, Members of Council, and Officers having been duly proposed and seconded, and the list circulated in accordance with Bye-law 74, and no alternative names having been proposed, were declared by the Chairman to be elected, viz.:—

As new Members of Council.—Sir George Holford, K.C.V.O., C.I.E., Mr. H. B. May, V.M.H., Mr. E. A. Bowles, M.A., F.L.S.

As Vice-Presidents.—The Duke of Bedford, K.G., the Rt. Hon. Joseph Chamberlain, the Rt. Hon. the Earl of Ducie, the Rt. Hon. Lord Rothschild, Leopold de Rothschild, Esq., C.V.O., Sir John T. D. Llewelyn, Bart., F.R.S., V.M.H.

As Officers.—Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H. (President), Mr. J. Gurney Fowler (Treasurer), the Rev. W. Wilks, M.A. (Secretary), Mr. Alfred C. Harper (Auditor).

The Victoria Medal of Honour was presented to Messrs. T. Coomber, J. J. Cypher, C. R. Fielder, H. B. May, and A. H. Pearson.

The Lawrence Medal for 1910 was presented to Messrs. James Veitch & Sons in acknowledgment of the very valuable and interesting exhibits they had staged during the year 1910.

Sir John Llewelyn proposed a vote of thanks to the President, which was seconded by Mr. Arthur Sutton and carried unanimously.

REPORT OF THE COUNCIL FOR THE YEAR 1910.

1. The One Hundred and Seventh Year.—The Journals, Reports, and Statistics of the Society give abundant evidence that the past year has been one of useful and progressive work.

2. Death of our Patron.—The lamented death of King Edward has been a great loss to our Society, of which he was the Patron, and in which he took a warm interest. The Council have subscribed one hundred guineas, in the name of the Society, to the Lord Mayor's Fund for a National Memorial.

3. New Patrons.—Fellows will be glad to hear that their Majesties King George V. and Queen Mary have graciously consented to become Patrons of the Society.

4. Vice-President.—His Grace the Duke of Bedford, K.G., has accepted office as a Vice-President of the Society.

5. Wisley Gardens.—The Council are pleased to notice that the

interest taken by the Fellows in the Society's Gardens continues to increase steadily, as is testified by the number visiting Wisley.

Suitable accommodation for the gardeners employed is being gradually provided, and the past year has seen the erection of a new bothy for a foreman and five journeymen.

Several recent valuable gifts of Orchids, and the necessity of giving the students a proper training in the cultivation of this very popular class of plants, made it essential to erect an Orchid House.

A new Stable has also been built.

Research and experimental work are being regularly carried on, and reports on Soil Sterilization, and on the trials of various plants, will appear shortly in the Journal.

A large number of Mr. Wilson's newly introduced plants from China, generously sent by the Hon. Vicary Gibbs and Messrs. James Veitch, have been added to those already planted.

The death of our Hardy Plant-Foreman, Mr. Frazer, is recorded with sincere regret.

6. School of Horticulture.—The School of Horticulture at Wisley now ranks as one of the most important and beneficial branches of the good work done by the Society. The tuition given is very much wider in its scope than was possible before the erection of the Laboratory. The advantage of such an institution to employers of gardeners is manifest. Students are subjected to written, oral, and practical examinations, undertaken by an independent examiner appointed for the purpose. The Government grant received by the School for the work of 1909 amounted to £265. Negotiations are proceeding with a view to affiliation with the University of London.

Fellows will be glad to learn that excellent work is already being done by past students, and very high commendation has been received concerning them. There is a growing demand for Horticultural Instructors in the Counties, and the Board of Education looks largely to our Society to supply this demand.

7. Spring Bulb Show.—The Spring Bulb Show on March 8th and 9th was one of the great successes of the year. It will probably be an annual fixture. The Show in 1911 is on March 14 and 15.

8. Temple and Holland House Shows.—It is hardly necessary to say that the Temple Show was a great success, being favoured with glorious weather. The Society is much indebted to the Treasurer and Benchers for again lending their gardens.

The Holland House Show proved more popular than ever, the number of visitors exceeding the highest record of any previous year.

The President and Council, speaking in the name of the Society, thank Mary, Countess of Ilchester, most warmly, for her kind and oft-repeated hospitality in lending her Park to the Society.

Fellows are particularly asked to notice (and to assist in making it widely known) that, owing to circumstances over which the Council

have no control, the Summer Show of 1911 will not be held at Holland House but at Olympia, Kensington, on July 4, 5, and 6.

9. Affiliated Societies Challenge Cup.—This Cup, competed for by exhibits of apples and pears from our Affiliated Societies, was won by the East Anglian Horticultural Society. It will be offered for competition on October 10, 1911, the winners of the last two years being excluded from again taking the Challenge Cup. Should, however, the winners of 1909 or 1910 exhibit again, and either of them be again adjudged first in order of merit, the Council will award to such Society a smaller silver cup, instead of the medal offered as second prize.

10. The Vegetable Show.—This Show having been fixed for a late date, to avoid clashing with another similar Show, was not an unqualified success. In 1911 it will be held on September 26; the schedule will be enlarged in some directions, and modified in others, to accord more nearly with the wishes of exhibitors.

11. Autumn Fruit Show.—The Autumn Fruit Show attracted the usual admirable display of British-grown fruits, there being hardly any noticeable falling off, in either the number or the quality of the entries, as a result of the distinctly unfavourable fruit season of 1910. The Council regret the comparatively small number of Fellows visiting this Show. In 1911 they have fixed Tuesday and Wednesday, October 10 and 11, for the Show, instead of the Thursday and Friday on which it has been hitherto held, hoping that the habitual Tuesday attendance of Fellows will bring more visitors to the Hall.

12. Colonial Fruit Show.—The Colonial Fruit Show was an unprecedented success, both in the magnificence of the display and the number of visitors. The Right Hon. Sir Edward Grey, Bart., H.M. Secretary of State for Foreign Affairs, opened the Exhibition. The large orchestral platform, which rises in many tiers to a height of 15 feet or more, was entirely covered, from one side of the Hall to the other, with boxes of splendid apples from British Columbia. This Exhibit was of such a unique character that the Council voted it a Gold Hogg Memorial Medal, this being the only occasion on which such an award has been made. A full report of the Show will appear in the Journal. (See vol. xxxvi., p. cxxxix.)

13. Masters Lectures.—The third and fourth Lectures in memory of the late Dr. Masters were delivered by Mr. A. D. Hall, F.R.S., on February 22 and March 22. His subject was "The Adaptation of the Plant to the Soil" (see R.H.S. Journal, vol. xxxvi., part 1).

Mr. G. F. Scott-Elliot, M.A., B.Sc., F.L.S., will deliver the 1911 lectures on February 28 and March 14:—Subjects, "Recent Work in Seed Selection" and "The Origin of Varieties."

14. Lawrence Medal.—The third Lawrence Gold Medal has been awarded by the Council to Messrs. James Veitch for a series of highly

meritorious exhibits during the year 1910, including the wonderful collection of Stove and Greenhouse Plants shown on October 25.

15. Hospitality to Japanese.—An opportunity of recognizing the debt which British Horticulture owes to Japan was afforded by the Japan-British Exhibition, and the Council took advantage of it in two ways. A deputation visited the gardens and horticultural exhibits at the Shepherd's Bush Exhibition, and made a considerable number of awards. They also invited the Japanese horticulturists in London, with a few other prominent Japanese gentlemen, to be guests of the Society at luncheon at the Holland House Show. These courtesies were warmly appreciated.

16. Visit to Woburn.—One of the pleasant recollections of the year is a visit to the Experimental Fruit Farm at Woburn, by special invitation of His Grace the Duke of Bedford. The party, consisting of Members of the Council and of the Scientific and Fruit Committees, were shown all the valuable and interesting research and experimental work which the Duke, with the assistance of Mr. Spencer Pickering, F.R.S., is carrying out at Woburn, and were also most handsomely entertained at the Abbey. The President and Council desire to thank the Duke and Mr. Spencer Pickering for the great interest they take in the Society and its work.

17. Deputations.—Deputations from the Council attended the following shows, and made awards, viz.:—The National Flower Show at Haarlem, on April 13; and the Fruit Congress at Hexham, on October 20.

18. Orchid Nomenclature.—A report on Nomenclature, summarizing the opinions of experts and hybridists at home and abroad, was sent from the Council to the Brussels International Horticultural Congress, which met in April, 1910. Dr. Rendle, F.R.S., and Mr. E. A. Bowles, M.A., represented the Society at the Congress, and it is gratifying to know that the Report of the Society was approved in some of its most important details. The report is now awaiting final confirmation by the next International Botanical Congress, before being finally adopted for International use.

19. Pritzels Index.—The negotiations for the re-issue of "Pritzels Iconum Botanicarum Index," by the co-operation of a number of Horticultural and Botanical Societies, not having progressed satisfactorily, a Committee was appointed by the Council to consider the matter. This Committee has met many times during the past year; and the Council hope that success may even yet crown its labours.

20. Library.—One of the most gratifying results of the past year's work is the establishment of the "Lindley Library" on a sure basis, as a perpetual adjunct of the Society. Under the original terms of the Trust, the Trustees might at any time have removed the books from the

custody of the Society. As long as that state of uncertainty existed, the Council never felt justified in spending more than a small sum annually out of the funds of the Society, in developing this valuable collection of horticultural and botanical works. The Trust deed has at last been modified—the existing Trustees have retired, and the Royal Horticultural Society, acting by and through its Council, has now been made sole Trustee, with the determining voice as to where the books shall be kept. The Library having thus become permanently attached to the Society, the Council have no longer any hesitation in spending the Society's funds on the purchase of valuable books; and a Committee consisting of Messrs. H. J. Veitch (Chairman), E. A. Bowles, C. Harman Payne, J. T. Bennett-Poë, and Dr. Daydon Jackson, with the Treasurer and Secretary *ex-officio*, has been appointed, to advise and assist the Council in the work of strengthening the Library.

21. Olympia Show, July 4, 5, 6, 1911.—Holland Park, as has been already mentioned, not being available this year, a new site for the Summer Show had to be found, and after considerable anxiety Olympia was fixed upon as the most advantageous place. The Great Hall and Annexe of Olympia will afford ample space for a magnificent exhibition, and the Council are sparing no effort so to arrange its details that the Show may be an unqualified success in every way. The usual features of a Summer Show—the open air, spacious lawns, and canvas tents—will be absent, but in their place there will be the advantages of wider gangways, dryness under foot, freedom from any of the unpleasant vagaries of our English climate, and last, but by no means least, the possibility of keeping the Show open in the evening.

The Main Hall will be surrounded by tiered staging rising to a height of 15 feet, upon which imposing groups of plants and flowers can be arranged; and at a lower level, the smaller exhibits on tabling will be placed so as to leave a wide central avenue. The Annexe is being reserved for rock and water gardens, grouped around a festooned and pillared rose garden.

Applications for the tiered staging for large groups (each allotment has a frontage of 28 feet with a depth of 25 feet), or for a floor space in the Annexe, should be made to the Secretary of the Society on or after February 14th, when a ground plan of the Great Hall will be on view.

Accommodation for Sundries has also been provided round the walls of the Main Hall. Those wishing to exhibit should at once book their position by applying to the Secretary.

22. International Horticultural Exhibition, May 22-30, 1912.—Most of the Fellows will have heard that an International Flower Show is to be held in London in the Spring of 1912. It should be fully understood that the Royal Horticultural Society is not organizing this Exhibition, which will be worked by an absolutely distinct, and entirely separate and independent organization. The Council have,

however, most warmly welcomed the proposal, and will render the Exhibition every assistance in their power.

The Executive of the Exhibition, recognizing the importance of securing the great weight of horticultural interest vested in the Society, have approached the Council with a view to establishing a suitable friendly working arrangement between the two bodies. Negotiations have accordingly been actively proceeding, whereby it has been decided that—

(a) The Council agree—

1. To forgo in 1912 the great Spring Show hitherto held, by kind permission of the Treasurer, Master and Benchers, in the gardens of the Inner Temple;
2. To contribute £1000 towards the expenses of promoting the International Exhibition; and
3. To guarantee a further sum of £4000 against the hardly probable contingency of there being an ultimate loss on the Exhibition.

(b) The Executive of the International Exhibition, 1912, agree—

1. To give to all Fellows of the Society certain special and definite privileges (which will be published in due time) in regard to the purchase of tickets for the Exhibition; and
2. To allow all such tickets purchased by Fellows of the Society to be transferable.

Fellows are particularly requested *not to write to the Society* on the subject of this Exhibition, but, if any communications are necessary, to address them to Edward White, Esq., Hon. Sec., International Horticultural Exhibition, 7 Victoria Street, S.W.

23. Recognition of Diligent Interest in Plants.—In response to frequent applications by school authorities for some token of encouragement of work with plants amongst their scholars, the Council have founded a card of "Recognition of Diligent Interest in Plants." It is to be awarded to the boy or girl who, in the yearly school competitions in plant cultivation, or garden-plot keeping, or nature study, has secured the first prize.

24. Obituary.—In addition to the loss of our late Patron, King Edward, the first name which will occur to any Fellow of the Society, who knows anything whatever of the Society's history, will be that of Baron Schröder. From the very difficult days of 1887, up to the last year of his life, the Society had no better friend than the Baron. In 1888 he was one of the first to help pay off the debt which then threatened the Society's very existence, and much as he disliked the Drill Hall he loyally supported the Council, and was himself an active member of it. When prosperity arose he began to urge the Council to embark on a Hall of their own, and had it not been for the great

financial difficulties in the City of London in the years 1891-2 he would then have succeeded in his project of building a Hall on the Thames Embankment not far from the Temple. Greatly disappointed, the Baron was not disheartened, and no sooner was the question mooted—"How shall we celebrate the Centenary of the Society?" than he answered unhesitatingly, "Build a Hall," and himself secured the present site, and gave £5,000 to the building fund, besides providing all the new book-cases, fittings and furniture for the Library.

To perpetuate the memory of the Baron, the Council have established a Schröder Life Pensionership, under the Rules and Regulations of the Gardeners' Royal Benevolent Institution, and Mrs. Wildsmith, the widow of an eminent gardener, who did much to help the Society in the difficult years of 1887, 1888 and 1889, has been appointed the first Schröder Pensioner.

Death has removed many other prominent Fellows during the year. Well known amongst them were Mr. Geo. S. Saunders, F.L.S., F.E.S., a valued Member of the Scientific Committee, and for a short time Editor of the Society's Journal; Lord Decies; Sir Charles Strickland, Bart.; Louisa Lady de Rothschild; Max Leichtlin; C. B. Plowright, F.L.S.; J. Forster Alcock; Drewett O. Drewett; W. J. Nutting; H. A. Tracey; etc., etc.

25. Victoria Medal of Honour.—Gaps in the ranks of our Victoria Medal of Honour have occurred by the deaths of Mr. W. Boxall, Mr. R. Wilson Ker, Mr. James McIndoe, Mr. David Thompson, and Baron Schröder. To fill these vacancies the Council have appointed Mr. Coomber, Mr. Cypher, Mr. E. R. Fielder, Mr. H. B. May, and Mr. A. H. Pearson, J.P., all of whom are well known in various branches of Horticultural work.

26. Pension Scheme.—A scheme of Annuity Pensions for members of the Society's Staff has been arranged during the year. The Annuity is provided for by equal contributions from the salaries of the officials concerned and the funds of the Society. Each Pension matures at the age of 65 or at death if occurring before.

27. The Hall.—The Hall has been kept in thorough repair. A travelling platform has been added in the highest part of the roof to ensure the safety of the men working there.

It is intended to redecorate the Hall in August 1911, and it will therefore be closed from August 2 to 28. In consequence there will be no Flower Show on August 15.

28. Presents.—The Council acknowledge and tender their warmest thanks for the many gifts which have reached them during the year. Valuable contributions have been given to the library; also to be mentioned are portraits of the late Lord Penzance from Miss Jekyll, and of the late Sir Charles Strickland from his daughter, Mrs. E. A. Willoughby; the late Mr. George S. Saunders's collections of insects

from Mrs. Edward Saunders; Orchids from Baron Bruno Schröder and Messrs. Sander; a further large assortment of Mr. E. H. Wilson's introductions from China sent by the Hon. Vicary Gibbs and Messrs. Jas. Veitch; a collection of Rhododendrons from Mr. John Waterer; a set of all the reports and papers published since 1843, recording Rothamsted investigations, presented by the Board of Agriculture with the sanction of His Majesty's Treasury; gifts of lantern slides from Mr. Jas. Hudson, V.M.H., and Captain A. Dorrien-Smith, D.S.O.

29. Annual Progress.—The following table will show the Society's progress in regard to numerical strength during the past year:

LOSS BY DEATH IN 1910.				FELLOWS ELECTED IN 1910.			
		£	s. d.			£	s. d.
Hon. Fellows	7	0	0 0	Hon. Fellows	3	0	0 0
Life "	13	0	0 0	4 Guineas	5	21	0 0
4 Guineas	3	12	12 0	2 "	705	1,480	10 0
2 "	50	105	0 0	1 Guinea	711	746	11 0
1 Guinea	71	74	11 0	Associates	37	19	8 6
	144	£192	8 0	Affiliated Societies	24	25	4 0
				Commutations	18		
					£372 4s. 6d.		
					1,503	£2,292	13 6
				Deduct Loss		687	4 6
				NET INCREASE IN INCOME		£1,605	9 0
LOSS BY RESIGNATION, &c.							
		£	s. d.				
4 Guineas	2	8	8 0	New Fellows, &c.		1,503	
2 "	122	256	4 0	Deaths and Resignations		495	
1 Guinea	197	206	17 0	NUMERICAL INCREASE		1,008	
Associates	15	7	17 6	Total on December 31, 1909		11,035	
Affiliated Societies	15	15	15 0				
	351	£495	1 6	Total on December 31, 1910		12,043	
TOTAL LOSS	495	£687	4 6				

30. Finance.—It will be noticed that the accounts are this year presented in a somewhat different form. The Trust Funds are now becoming so numerous that the Council consider the time has arrived when each of them should be recorded separately and show (1) the manner in which the funds are invested, (2) the income received during the year, and (3) the disposal of the same.

31. Examinations.—The Society's examinations were held for Public Parks Gardeners, School Teachers, and in General Gardening, the number of Candidates being considerably in excess of former years.

32. Committees, &c.—The Society owes a constantly recurring debt to the Members of the Committees, Judges, Writers of Papers for the Journal, Compilers of Extracts, Reviewers, Lecturers, and the several Examiners, who during the past twelve months have done so much to contribute to the Society's usefulness, and to help maintain its high standing among the practical and scientific institutions of the world.

In consequence of the great increase in the work of the Floral Committee, it has been found necessary to appoint a second Chairman, so

To ESTABLISHMENT EXPENSES—					£	s.	d.	£	s.	d.
Ground Rent	...	...	...	...	690	0	0			
Rates and Taxes	...	...	...	...	460	6	1			
Water Rate	...	...	...	...	76	13	0			
Electric Light	...	...	...	...	205	1	10			
Gas	...	...	...	...	34	11	1			
Insurances	...	...	...	...	67	11	11	1,524	3	11
Salaries and Wages	...	...	...	...	1,853	0	6			
Printing and Stationery	...	...	...	...	1,048	16	11			
Postages	...	...	...	...	443	9	10			
Fuel	...	...	...	...	65	10	0			
Professional Fees	...	...	...	...	144	0	10			
Gratuities	...	...	...	...	59	0	0			
Repairs and Renewals (including £150 for Hall Painting)...	...	...	...	...	409	0	9			
Miscellaneous Expenses	...	...	...	...	329	11	4			
Portrait (Sir Thomas Hanbury)	...	...	...	...	114	16	0			
Iron Gates front of Hall	...	...	...	...	60	17	0			
Travelling Platform for Roof	...	...	...	...	74	5	0			
Bay Trees front of Hall	...	...	...	...	25	0	0	4,627	8	2
" JOURNAL, PRINTING AND POSTAGE	...	...	...	...				3,087	4	7
" PAINTING ORCHID PICTURES...	...	...	...	...				43	17	6
" STAFF PENSION	...	...	...	...	193	19	1			
Less contributed by the Staff, as per scheme	...	...	...	...	98	17	2	95	1	11
" SHOWS and MEETINGS—										
Temple Show	...	...	...	...	919	2	1			
Holland Park Show	...	...	...	...	805	8	6			
Colonial Show	...	...	...	...	60	9	5			
Autumn Fruit Show	...	...	...	...	382	1	0			
Labour, Floral Meetings and Conferences	...	...	...	...	176	13	10			
Expenses do. do.	...	...	...	...	90	14	1			
Deputation Expenses	...	...	...	...	75	15	9	2,510	4	8
" PRIZES and MEDALS—										
Awarded at Society's Shows	...	...	...	...	535	17	3			
Awarded by Deputation at other Shows	...	...	...	...	59	9	6	595	6	9
" WISLEY GARDENS—										
Rates, Taxes, and Insurances	...	...	...	...	72	12	10			
Superintendent's Salary	...	...	...	...	250	0	0			
Labour	...	...	...	...	967	10	5			
Garden Implements	...	...	...	...	109	11	8			
Loam and Manure	...	...	...	...	113	9	1			
Repairs	...	...	...	...	90	2	9			
Fuel	...	...	...	...	231	9	6			
Miscellaneous Expenses	...	...	...	...	195	6	5			
Trees and Shrubs	...	...	...	...	10	9	6	2,040	12	2
" COST of GROWING, PACKING, and DISTRIBUTION of PLANTS to FELLOWS	...	...	...	...				251	15	0
" LABORATORY, WISLEY—										
Salaries	...	...	...	...	340	0	0			
Miscellaneous Expenses	...	...	...	...	95	0	11			
Prize Fund	...	...	...	...	13	1	4	448	2	3
" CONTRIBUTION to INTERNATIONAL EXHIBITION, 1912	...	...	...	...				1,000	0	0
" CONTRIBUTION to LINDLEY LIBRARY	...	...	...	...				70	0	0
" CONTRIBUTION to KING EDWARD'S MEMORIAL	...	...	...	...				105	0	0
" SCHRÖDER PENSION ANNUITY, purchase of £500 Great Western Rly. 4% Debenture Stock cost	...	...	...	...				557	14	6
" SCHRÖDER PENSION (Gardeners' Royal Benevolent Institution)...	...	...	...	...				20	0	0
" DEPRECIATION—										
Hall Glass Roof, Furniture, Glass Houses, Wisley, Plant and Materials	...	...	...	...				511	18	10
" BALANCE, carried to Balance Sheet	...	...	...	...				8,370	7	9
								£25,858	18	0

ACCOUNT for YEAR ending DECEMBER 31, 1910.
Cr.

					£	s.	d.	£	s.	d.
By ANNUAL SUBSCRIPTIONS	...	...	...					16,500	5	0
„ ENTRANCE FEES	...	...	...	...				422	2	0
„ DIVIDENDS AND INTEREST	...	...	...	...	1,665	11	4			
„ Do.	DAVIS TRUST				53	13	8			
„ PROFIT ON INVESTMENTS	...	...	...		63	19	4	1,783	4	4
„ SHOWS AND MEETINGS—										
Temple Show	...	...	...	...	1,481	11	9			
Holland Park Show	...	...	...	...	1,060	8	6			
Colonial Show	...	...	...	...	68	18	0			
Autumn Fruit Show	...	...	...	...	17	19	0			
Takings at Hall Shows	...	...	...	...	273	6	6	2,902	3	9
„ JOURNALS AND OTHER PUBLICATIONS—										
Advertisements	...	...	...	...	737	19	9			
Sale of Publications	...	...	...	...	284	13	10	1,022	13	7
„ HALL LETTINGS	...	...	...	...	2,516	12	10			
Less Labour Expenses	...	...	...	...	228	0	7	2,288	12	3
„ PRIZES AND MEDALS	...	...	...	...				190	4	4
„ EXAMINATIONS IN HORTICULTURE—										
Amount received in Fees	...	...	...	...	175	15	0			
Less expended	...	...	...	...	102	16	11	72	18	1
„ WISLEY GARDENS—										
Produce sold	...	...	...	...	41	13	11			
Students' Fees	...	...	...	...	31	10	0			
Inspection of Gardens	...	...	...	...	252	0	0			
Rebate Income Tax	...	...	...	...	28	5	9	353	9	8
„ EDUCATIONAL GRANT, WISLEY SCHOOL	...							265	10	0
„ LIFE COMPOSITIONS—										
Being amounts paid by Fellow now deceased								57	15	0

£25,858 18 0

	£	s.	d.	£	s.	d.
To CAPITAL FUNDS ACCOUNT—						
As at December 31, 1909	35,820	9	10			
Less transfer of the Funds shown separately—						
Williams Memorial Fund £168 0 0						
Masters " " 290 13 6						
Nicholson " " 33 12 6						
	492	6	0			
	35,328	3	10			
LIFE COMPOSITIONS received since	372	4	6			
Less Fees paid by Fellows now deceased	57	15	0			
	314	9	6			
				35,642	13	4
„ SUNDRY CREDITORS				536	16	3
„ SUBSCRIPTIONS, &c., paid in advance				620	10	6
„ WISLEY SCHOLARSHIP—						
Balance December 31, 1909	56	5	0			
Less paid to Scholars	43	15	0			
				12	10	0
„ RESERVE ACCOUNT—HALL PAINTING				300	0	0
„ DEPRECIATION AND RENEWALS RESERVE ACCOUNT—						
As at December 31, 1909	1,981	5	2			
Added this Year	511	18	10			
	2,493	4	0			
„ WILLIAMS MEMORIAL FUND				23	1	8
„ MASTERS MEMORIAL FUND				7	7	3
„ NICHOLSON MEMORIAL FUND				33	12	6
„ LINDLEY LIBRARY TRUST				17	4	1
„ LAWRENCE TESTIMONIAL FUND				127	0	5
„ SCHRÖDER PENSION				9	8	4
„ INTERNATIONAL EXHIBITION, 1912— Amount contributed by Royal Horticultural Society	1,000	0	0			
Less paid	700	0	0			
				300	0	0
„ GENERAL REVENUE ACCOUNT—						
Balance, December 31, 1909	57,198	3	5			
Less Davis Trust Fund shown separately	1,797	8	9			
„ Bad Debts	16	13	6			
	1,814	2	3			
	55,384	1	2			
„ REVENUE FOR THE YEAR, as per annexed Account	8,370	7	9			
				63,754	8	11

DECEMBER 31, 1910.

Cr.

	£	s.	d.	£	s.	d.
By CAPITAL EXPENDITURE—						
„ NEW HALL AND OFFICES—						
As at December 31, 1909				40,950	11	2
„ FURNISHING HALL AND OFFICES—						
As at December 31, 1909				2,165	6	5
„ DWELLING HOUSES, WISLEY—						
As at December 31, 1909	2,390	5	7			
Expenditure since (Bothy, Stables, &c.)	1,735	7	11			
				4,125	13	6
„ GLASS HOUSES, RANGES, POTTING SHED, &c., WISLEY—						
As at December 31, 1909	4,097	10	0			
Expenditure since on Orchid House	463	4	6			
				4,560	14	6
„ LABORATORY, WISLEY—						
As at December 31, 1909				1,627	14	11
				53,430	0	6
„ PLANT AND MATERIALS—						
Appliances for Shows	236	11	0			
Furniture and Fittings, Wisley, as at December 31, 1909	58	8	6			
Expenditure since, Furniture for Bothy	106	17	6			
				165	6	0
Horse and Cart, Garden Plant, &c.	89	4	11			
Fencing and Wire Netting, Wisley	102	6	9			
Scientific Instruments and Fittings, Laboratory	175	6	5			
Breakable Apparatus, Laboratory	95	2	4			
				863	17	5
„ SUNDRY DEBTORS AND PAYMENTS MADE IN ADVANCE				1,186	16	6
„ INVESTMENT OF DEPRECIATION AND RE-NEWAL AND RESERVE ACCOUNT—						
3½ % India Stock, £2,028 8s. 3d. cost				1,981	5	2
„ INVESTMENTS—						
2½ % Consols, £8,553 15s. 2d. cost	8,162	16	0			
3 % Local Loans, £5,800	6,006	16	6			
3½ % Indian Rupee Paper, 37,000 Rupees	2,462	14	4			
3½ % Dominion of Canada Registered Stock, £2,000	2,000	0	0			
4 % Canadian Pacific Rly. Co. Consolidated Debenture Stock, £4,632 cost	4,999	14	1			
3½ % London County Consolidated Stock, £3,000 cost	3,020	13	6			
4 % Great Eastern Rly. Debenture Stock, £3,500 cost	3,969	17	3			
3½ % India Stock, £2,063 4s. 6d.	2,024	10	4			
4 % Northern Pacific and Great Northern Rly. Joint Bonds £5,000 cost	5,056	6	0			
4½ % New York Central and Hudson River Railroad Co. Gold Debentures £6,000 cost	5,857	6	9			
4 % Chicago, Milwaukee & St. Paul Rly. Co. 25 years. Gold Bonds £2,000 cost	1,930	4	0			
				45,490	18	9
<i>The approximate value of these Investments on January 1, 1911, was £41,970 7s.</i>						
„ CASH—						
At Bank	870	11	11			
In Hand	54	7	0			
				924	18	11
				£103,877	17	3

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position of the Society on December 31, 1910.

ALFRED C. HARPER, F.C.A., Auditor (HARPER BROTHERS AND FEATHER),
Chartered Accountant, 10 Trinity Square, London, E.C.

January 14, 1911.

25

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To A

WILLIAMS MEMORIAL FUND.

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100	100	100

MASTERS MEMORIAL FUND.
 Deceased by Donations in 1908 in Memory of Dr. Masters towards the Provision of one or more Annual Lectures.

To	A	H	I
	"	"	"

To A	1	C	I
"	"	"	"

NICHOLSON MEMORIAL FUND.
 Raised by Donations in 1908 in Memory of George Nicholson for Prizes to Wisley Students.

To

SCHRÖDER PENSION.
DONORS: 2314. Dental Hygienists' Association for one pension.

To

that one may (as far as possible) devote himself to the plants for Certificate, and the other to the groups in the Hall.

The Council also acknowledge their obligations to the Press for their invaluable assistance in reporting upon, and calling attention to, the work of the Society.

33. List of Plants Certificated.—From time to time it becomes necessary to issue a corrected list of the plants and fruits Certificated by the Society. A new revision up to December 31, 1910, has been made and may now be obtained from the office—Orchids, 5/-; Fruits and Vegetables, Decorative Plants, Ferns, and Flowers, 2/-. It is hoped that Fellows will provide themselves with these necessary records covering the last fifty years.

By Order of the Council,

W. WILKS, *Secretary*.

ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W.

December 31, 1910.

GENERAL MEETING.

FEBRUARY 28, 1911.

Professor W. BATESON, M.A., F.R.S., V.M.H., in the Chair.

Fellows elected (108).—W. J. Abrahams, E. J. Allard, E. K. Allen, Mrs. W. E. Dunbar Anderson, Mrs. M. F. Armitage, W. D. Arton, J.P., Sir L. Aubrey-Fletcher, Bart., W. A. Bailey, E. L. Balcombe, R. J. Barnes, Sir John Barran, Bart., Miss N. Besley, Miss Blake, J. P. Blessig, Mrs. G. Bolus, Mrs. F. W. Brind, Mrs. B. H. Brough, J. G. Brown, Mrs. H. Buxton, Mrs. S. H. Byass, H. Byass, F. V. Chalmers, Mrs. E. M. Crosse, C. W. Darley, I.S.O., G. de Grey, Mrs. C. H. Dent, Miss A. de Winton, H. Dickson, Mrs. M. E. Downes, Mrs. F. R. Doxat, Charles W. Edwards, Miss M. K. Ericsson, Miss E. G. Fenwick, Dr. J. E. M. Finch, Major L. A. Forbes, Mrs. D. L. Freeland, Dr. J. F. Goodhart, Mrs. James Gow, Mrs. W. Gundry, Hon. Mrs. Halford, Miss Hare, J. E. Harman, Lady Heneage, Hon. Mrs. Hicks-Beach, Arthur Hill, Mrs. Archdall Hill, Mrs. H. E. Hollins, Mrs. F. L. Johnson, W. J. Johnston, Eric M. Jones, Miss E. Ashton Jonson, Rev. E. E. Kelly, E. C. Kingdon, J. Langridge, A. E. Lasenby, Mrs. Arthur Lee, Lieutenant-General J. B. Leefe, Mrs. M. Lehmann, Miss W. Lindsay-Smith, Mrs. F. A. Lindsay-Smith, Miss L. M. Lowe, Mrs. A. Macdonald, Mrs. F. F. Mackenzie, Mrs. E. M. F. MacKirdy, Miss C. H. McQueen, Mrs. Maltwood, Mrs. H. C. Marshall, Miss E. F. Mathieson, F. Maud, Miss A. H. Morton, Major W. P. Nash, Mrs. W. P. Nash, Albert Pam, Mrs. Pickop-Dutton, F. H. Pickworth, A. J. S. Preece, Mrs. A. R. Prince, Mrs. Rankin, B. G. Ravenscroft, H. L. S. Richardson, M. H. Richardson, Mrs. Rigby, Miss E. M. Robertson, Miss Robins, Miss

W. Sams, Colonel E. Satterthwaite, C.B., Miss N. Sheppard, Miss L. Sinclair, B. Franklin Smith, Mrs. W. Sopper, T. Spencer, C. B. Spittall, Mrs. Starling, Mrs. E. M. Stevenson, Robert Tait, jun., Mrs. Thompson, Mrs. Tootal, Mrs. E. B. Trotter, D. Vigo, Mrs. S. Wales, Mrs. A. B. Walkley, Miss S. Warner, Miss A. J. Weighall, R. H. Wiles, Mrs. P. Wilkins, T. H. Willett, T. Wilyman, Mrs. R. Woolcombe.

Fellows resident abroad (4).—K. Biswas (India), G. Geyne (Africa), G. Monckton (Africa), W. L. Wood (India).

Associate.—M. Oliver.

Societies affiliated (2).—Devon and Exeter Gardeners' Association, Wollongong (N.S.W.) Horticultural Society.

The fifth Masters Memorial Lecture was given by Mr. G. F. Scott-Elliott, M.A., B.Sc., F.L.S., on "Single Seed Selection" (see p. 1).

GENERAL MEETING.

MARCH 14, 1911.

Professor W. BATESON, M.A., F.R.S., V.M.H., in the Chair.

Fellows elected (96).—Mrs. J. F. Anderson, J. S. Aplin, C. S. Awdry, W. M. Blyth, A. H. Bright, H. Brotherston, A. Burton, W. Burton, Miss E. Byrne, H. St. John Cavell, Mrs. Eric Charrington, Mrs. T. Willes Chitty, Mrs. B. Church, the Earl of Clarendon, Captain G. van Holt Clarke, Mrs. T. Close, Lewis Coker, Major P. Cookson, Mrs. F. W. B. Cowley, E. Warwick Cox, George Cox, Sir William J. Crump, Miss Cunard, H. S. Daniell, Miss A. F. Davie, Mrs. B. Dawson, H. W. Dewes, D. Dolton, the Earl of Egmout, Miss D. Elliott, Miss Errington, F. C. Forward, A. E. Fox, Mrs. W. Fuller, T. H. Gaunt, Miss E. M. Gladstone, Rev. J. Gledhill, Miss H. A. Godfray, Miss Gore, E. B. Gould, I.S.O., S. Graveson, R. J. E. Green, Miss M. Christie Griffiths, Colonel J. Lees Hall, Mrs. C. A. H. Hall, Mrs. Hargreaves, Miss E. F. Harvey, Miss Hodgkin, Mrs. Hodgkin, Mrs. C. Horwood, W. G. Howarth, M.A., F.R.C.S., Mrs. W. G. S. Hynde, Mrs. Randle Jackson, G. H. Johns, Miss Jones, Mrs. Jones, J. Keay, Mrs. C. M. Kennedy, Mrs. Bruno Kohn, V. Langbein, the Marquis of Lansdowne, A. Latham, M.D., F.R.C.P., Miss Massy Lloyd, E. Lucas, Mrs. W. McGildowny, Mrs. C. McNaughtan, Mrs. J. F. Mathieson, Andrew Michie, Sinclair Morrison, Herbert Moss, Miss M. Nicholls-Jones, T. Norris, Mrs. P. H. Osborne, Mrs. F. R. Pease, Mrs. Pell, Mrs. Pitt, Mrs. H. L. Puckle, E. R. Ranson, Miss M. I. Robins, G. R. J. Rumbol, Mrs. W. A. St. Quintin, Mrs. E. W. Shannon, Mrs. Spagnoletti, Mrs. A. G. Spencer, J. M. S. Stanhope, F. Stern, F. C. Stewart, W. E. Tallents, Mrs. G. Teague, A. F. C. Tollemache, Miss S. Trench, Mrs. E. Walker, Mrs. H. de R. Walker, T. W. Wellsted, E. Whiteaway, Miss E. S. Wigram.

Fellows resident abroad (2).—Jacques L. de Vilmorin (Paris), W. D. Wilson, B.Sc. (Victoria).

Associate.—Hon. Mildred Campbell.

Societies affiliated (2).—Hendon Hort. Soc., Twickenham Gardeners' Association.

The sixth Masters Memorial Lecture was given by Mr. G. F. Scott-Elliot, M.A., B.Sc., F.L.S., on "Changing of Species" (see p. 9).

SHOW OF FORCED SPRING BULBS.

TUESDAY AND WEDNESDAY, MARCH 14 AND 15.

HYACINTHS, TULIPS, AND DAFFODILS.

The Council offered (subject to the General Rules of the Society) the following Prizes presented to them by the General Bulb Growers' Society at Haarlem:—

Division I.—For Amateurs.

Class 3.—18 Hyacinths, distinct.

First Prize, £6 6s.; Second, £5 5s.; Third, £4 4s.; Fourth, £3 3s.; Fifth, £2 2s.; Sixth, £1 1s.

1. The Hon. Vicary Gibbs, Aldenham House, Elstree (gr. Mr. E. Beckett).
2. The Duke of Portland, Welbeck Abbey, Worksop (gr. Mr. J. Gibson).
3. A. Hanson, Esq., Ivanhoe, Victoria Park, Wavertree.
4. C. Watney, Esq., Garston Manor, Watford (gr. Mr. G. Dyke).
5. The Hon. J. Whitelaw Reid, Wrest Park, Amptill (gr. Mr. G. Mackinlay).
6. H. S. Bartleet, Esq., Severndroog, Shooters Hill.

Class 4.—12 Hyacinths, distinct.

First Prize, £5 5s.; Second, £4 4s.; Third, £3 3s.; Fourth, £2 2s.; Fifth, £1 1s.

1. The Marquis of Salisbury, Hatfield House, Herts (gr. Mr. H. Prime).
2. F. R. Dixon-Nuttall, Esq., Ingleholme, Prescott (gr. Mr. J. W. Barker).
3. Lord Howard de Walden, Audley End, Saffron Walden (gr. Mr. J. Vert).
4. Mrs. McDowell Nathan, Little Heath Wood, Potters Bar (gr. Mr. W. H. Newton).
5. Miss C. A. Michell, Oakfield, Cricklewood.

Class 5.—6 Hyacinths, distinct.

First Prize, £2 2s.; Second, £1 10s.; Third, £1 1s.; Fourth, 10s.

1. Lord Hillingdon, Wildernes, Sevenoaks (gr. Mr. J. Shelton).

2. Mrs. H. Faudel-Phillips, Holmwood, Edenbridge (gr. Mr. H. Spittle).
3. F. Harrison, Esq., Eaton Bank, Wavertree (gr. Mr. W. Betley).
4. Lady Tate, Park Hill, Streatham Common (gr. Mr. W. Howe).

Class 6.—4 pans containing Hyacinths, 10 roots of one variety in each pan. The blooms of each pan to be of distinctly different colour from those of the other three pans. The bulbs need not have been actually grown in the pans they are shown in.

First Prize, £4 4s.; Second, £3 3s.; Third, £2 2s.; Fourth, £1 1s.

1. { The Duke of Portland. } equal.
 { The Hon. Vicary Gibbs. }
3. The Marquis of Salisbury.
4. The Hon. J. Whitelaw Reid.

Division II.—For Trade Growers.

Class 7.—Collection of 100 Hyacinths, in 25 named varieties, 4 blooms of each variety, grown in pots or glasses.

Prize, the Gold Medal of the General Bulb Growers' Society of Haarlem.

1. Messrs. R. & G. Cuthbert, Southgate Nursery, Middlesex.

Class 8.—Collection of 120 Hyacinths in 12 varieties in pans. 10 roots of one variety in each pan. The bulbs need not have been actually grown in the pans they are shown in.

Prize, the Gold Medal of the General Bulb Growers' Society of Haarlem.

1. Messrs. R. & G. Cuthbert.

BULBS GROWN IN MOSS, FIBRE, &C.

Subject to the General Rules of the Society the Council offer the following Prizes presented to them by Mr. Robert Sydenham:—

Classes 9, 10, 11. *Bulbs grown in moss, fibre or similar material (not earth) and without drainage.*

Amateurs.

Class 9.—Six single Hyacinths, in separate vases, not exceeding 6 inches in diameter, to be selected from any one of the following varieties: 'Enchantress,' 'Innocence,' 'Isabella,' 'Jacques,' 'Johan,' 'King of the Blues,' 'Koh-i-Noor,' 'Ornament Rose,' 'Princess May,' 'Queen of the Blues,' 'Roi des Belges,' 'Rose à Merveille,' 'Schotel.'

Prizes, 21s., 17s. 6d., 15s., 10s. 6d., 7s. 6d.

1. Miss C. A. Michell.
2. Lady Tate.
3. Miss E. M. Rawlins, Great Houghton Hall, Northampton.

Class 10.—Six vases of Tulips (vases not exceeding 7 inches in diameter), no restriction as to the number of bulbs in a vase, to be selected from the following: 'Duchesse de Parma,' 'Fabiola,' 'Joost van Vondel,' 'Keizerskroon,' 'La Reve,' 'Mon Tresor,' 'Prince of Austria,' 'Queen of the Netherlands,' 'Rose Gris de Lin,' 'Van der Neer,' 'Vermilion,' 'Brilliant,' 'White Joost,' 'Van Vondel.'

Prizes, 21s., 17s. 6d., 15s., 10s. 6d., 7s. 6d.

1. Lady Tate.
2. The Hon. Mrs. Guy Baring, St. Cross Mill, Winchester.
3. Miss Gordon Thompson, The Elms, Potters Bar.

Class 11.—Six vases of Narcissi (vases not exceeding 7 inches in diameter), no restriction as to the number of bulbs in a vase, to be selected from the following: 'Blood Orange,' 'Bullfinch,' 'C. J. Backhouse,' 'Dairymaid,' 'Emperor,' 'Glitter,' 'Horace,' 'Leonie,' 'Lilian,' 'Lulworth,' 'Madame de Graaf,' 'Red Flag,' 'Victoria,' 'White Lady.'

Prizes, 21s., 17s. 6d., 15s., 10s. 6d., 7s. 6d.

1. Miss E. M. Rawlins.
2. Lady Tate.
3. The Hon. Mrs. Guy Baring.
4. Miss C. A. Michell.

GENERAL MEETING.

MARCH 28, 1911.

Mr. W. A. BILNEY, J.P., in the Chair.

Fellows elected (88).—C. F. Addis, M. Arnold, C. H. Atkinson, W. Banks, Mrs. G. Berridge, Mrs. Blaber, Miss M. E. T. Blewitt, Rev. C. Black, Mrs. N. A. Black, G. W. S. Brewer, H. Brookman, Mrs. H. J. Brown, Mrs. J. M. Brown, S. Stanley Brown, Mrs. Bruce, Mrs. C. Calthrop, W. Campbell, Lady Channell, R. B. Chessum, T. Clegg, A.R.C.Sc., F.G.S., A. B. H. Colls, Mrs. J. Couper, Major A. Capel Cure, Mrs. Davy, S. de Lissa, Mrs. E. B. Denny, F. R. Durham, Miss A. I. M. Elliot, J. Evans, T. H. Faulkner, A. Frewin, Mrs. W. Gamble, W. B. Gingell, C. J. Gleed, Miss Goldsmith, T. J. Griffin, Mrs. Eric Hambro, Mrs. Hedley, E. Heisch, C. O. Heron, Mrs. Hextall, Miss E. Howard, A. A. Humphrey, Mrs. A. Joshua, S. J. Lyons, Hon. Mrs. A. Lyttelton, Mrs. McBain, P. Machin, W. S. McLaren, Mrs. L'Estrange Malone, A. Mathieson, Rev. H. R. Meyer, Sir P. C. J. Milbank, Bart., Mrs. Moores, W. Morris, L. Paton, J. Pearson, Mrs. F. Penington, Mrs. W. A. Perrin, R. Poore, J. Powell, R. Prestige, Stephen Price, L. Roberts, J. Rogers, Miss A. Rose, Lady Runtz, W. G. Rushton, G. I. Russell, Mrs. Sale, A. Schlegel, T. Simonds, Mrs. D. Singer, Dr. C. A. Casterton Smelt, H. W. Carleton Smith, Mrs. Arthur Smith, Mrs. J. Mackintosh Smith, T. H. R. Smythe, J.P., Mrs.

C. P. Sparks, F. Straker, Mrs. W. Talbot, J. A. Trenchard, Mrs. D. F. Tuffill, G. H. Unwin, D. Walker, A. G. W. Wilkinson, C. H. A. Wilson, Mrs. E. T. Wise.

Fellows resident abroad (2).—Chr. Kieft (Haarlem), W. J. Philson (Auckland, N.Z.).

Associates (3).—Miss A. M. Acland, N. Donaldson, Miss H. Leather.

Societies affiliated (3).—Barry Horticultural Society, The National Gladiolus Society, St. Denys Horticultural Society.

A lecture on "Alpine Plants in their Native Haunts" was given by Mr. R. C. Reginald Nevill (see p. 65).

GENERAL MEETING.

APRIL 11, 1911.

SIR DANIEL MORRIS, K.C.M.G., D.Sc., V.M.H., in the Chair.

Fellows elected (69).—Mrs. C. H. Alington, J. C. Anderson, J. Archer, C. Beadle, Mrs. J. B. Birkbeck, Mrs. C. Boyle, C. E. Bright, C.M.G., Mrs. S. Burt, Lady George Campbell, Miss M. J. Carlisle, Mrs. Caulfield, H. Churchman, Mrs. R. A. Cooper, G. C. Dawson, F.S.I., H. P. E. Drayton, Mrs. H. P. E. Drayton, Miss DuPre, Mrs. S. Eaton, Miss V. Egerton, T. C. Elliott, Mrs. J. R. Fitzmaurice, Mrs. E. Glover, Miss R. M. Godley, Mrs. L. Griffiths, Mrs. M. Hale, J. Handscombe, Mrs. Nelson Harness, A. Hassall, Mrs. J. Hastings, Mrs. F. Head, Miss Boothby Heathcote, Mrs. J. S. Hill, T. F. Hollis, Mrs. A. Howard, L. E. Janson, A. Hewett Jay, Miss E. Johnson, The Countess of Kilmorey, H. Lane, J. Lee, J. M. Leggatt, Mrs. W. St. Quentin Leng, The Countess Dowager of Lonsdale, Mrs. R. C. Lorimer, Miss K. P. Mair, E. E. Minns, Mrs. R. Moseley, Lady Nunburnholme, Miss C. O'Brien, J. E. Ollivant, Mrs. Eric Penn, Mrs. J. G. Priestley, Miss F. M. Rawlinson, Dr. H. Shelmerdine, S. A. Shepherd, W. W. Shorter, G. Slatter, Mrs. H. Sutton, Mrs. R. R. Symon, Mrs. E. R. Thompson, R. K. Tucker, H. G. Twist, Miss A. Valleris, H. Lumley Webb, H. T. Weeks, Dr. A. Whitfield, Mrs. J. T. Wigan, Dr. J. F. Williams, H. J. Wood.

Fellows resident abroad (5).—George Mills (Waerenga, N.Z.), Andrew L. Oliver (Bloemfontein), Lionel P. Powell (Saharanpur), Satya S. Raturi (Tehri, India), James Rock (Huntley, N.Z.).

Associate.—Miss I. Colvin.

Societies affiliated (2).—Ludgate Circus Club (Horticultural Section), Worcester County (Mass., U.S.A.) Horticultural Society.

A lecture on "The Origin and Structure of Aquatic Flowering Plants" was given by the Rev. Prof. G. Henslow, M.A., F.L.S., V.M.H. (see p. 88).

GENERAL MEETING.

APRIL 25, 1911.

Mr. W. A. BILNEY, J.P., in the Chair.

Fellows elected (47).—Mrs. J. F. Allen, Mrs. H. D. Anderson, Hon. John Ashburnham, W. R. Bassett, A. H. V. Bobe, C.E., Rev. J. L. Bryans, Mrs. W. J. Busteed, Miss Chawner, Miss F. A. Cooper, Mrs. M. Crompton-Roberts, Captain W. G. T. Currie, Mrs. Disney, A. C. Downes, Captain G. Eckford, Surgeon-General P. M. Ellis, Mrs. W. Forsyth, A. Garside, H. Gee, C. H. N. Hardinge, J. Harris, Mrs. E. J. Harrison, G. E. Chadwyck Healey, Hon. Mrs. Hope, Mrs. Alfred Howard, L. Jorgensen, Captain V. G. W. Kell, Miss Kolle, Miss Letts, J. Arthur Levy, Mrs. Lovell, H. P. Norman, Mrs. J. M. Oldham, W. J. H. Perry, Colonel B. P. Portal, D.S.O., Hon. Mrs. Royse, Mrs. E. Salaman, F. W. Seers, Mrs. W. L. Seligman, Shivanath Singh, H. G. Sketchley, W. Close Smith, W. H. Stansfield, Mrs. G. Streatfield, E. A. Taylor, Mrs. W. A. Tennant, H. E. Tompkins, Lady Waterlow.

Fellows resident abroad (4).—R. Badgery (Cawnpore), C. Blamfried (Guernsey), J. W. Collard (Henderson, N.Z.), E. T. J. Wilkie (Malay States).

Society affiliated.—Cottenham Park Cottage Garden Society.

A lecture on "The Tulip—its Problems and History" was given by the Rev. Joseph Jacob.

SCIENTIFIC COMMITTEE.

JANUARY 3, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and
nine members present.

Sporting in Begonias.—Mr. J. Hudson, V.M.H., sent specimens showing sporting in winter-flowering Begonias. Last year a sport had appeared in Begonia 'Agatha,' with flowers larger and of a brighter colour than those of the type. Plants were propagated from the sport and came true, but on one plant one half again sported and produced flowers still larger than in the first sport and with foliage twice as large. The Committee expressed the hope that specimens of each of these sports should be kept and dried, so that comparisons could easily be made in the future and the whole history of the sports followed.

Fruiting of Mandevilla suaveolens.—Mr. Chittenden showed, on behalf of Mr. Saunderson, of Joanville, Jersey, a pair of fruits of *Mandevilla suaveolens*, which had ripened in the garden there. This plant can be grown outdoors only in warmer parts of England, and is not often known to fruit. The fruits, as in so many of the *Asclepiadaceae*, are pods about 12 inches in length and slender, and are produced in pairs.

Pine-apples with rotten core.—Some Pine-apples of excellent flavour, but with a brown rot in the core, were received from Natal. Mr. Fawcett, F.L.S., said that the condition was very well known in the West Indies, and was particularly prevalent in the variety shown, which he recognized as the deliciously flavoured 'Ripley.' Whatever the cause, he believed it originated before the Pines were cut, and, therefore, whilst they were growing. The rot has been attributed to different causes by different investigators. It has been examined in the States and said to be connected with the growth of a species of *Fusarium*, which, presumably, gains an entrance into the root from the soil, but the disease does not appear to have been reproduced by inoculation by this fungus (see *Jamaica Botanical Bulletin*, ser. ii. vol viii. (1901), p. 83, vol. xi. (1902), p. 165). Mr. G. Massee, V.M.H., in his "Diseases of Cultivated Plants," attributes the disease to physiological causes, pointing out that it is prevalent when the plants are ripening during the rainy season, and associating it with excess of water in the atmosphere. A similar trouble occurs in pine-pits in this country, especially when the plants are subjected to a check through a sudden lowering of the temperature.

SCIENTIFIC COMMITTEE, JANUARY 17, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and eleven members present.

Sap exudation in Elm trees.—Mr. J. Fraser, F.L.S., showed a piece of the bark of an Elm tree perfectly white, part of a strip extending down the trunk of a tree from a small wound some distance up. He remarked that wounds in Elms may bleed for several years, as they often take many years to heal. The white appearance of the strip was due to the death of the green alga which covered the trunk elsewhere, but which, where the sap flowed, had been destroyed. Mr. Fraser thought that possibly the sap of the tree itself had had an injurious effect upon the alga.

Azalea gall.—A galled growth from *Azalea indica* came from Cheltenham. The whole of the leaves at the tip of a shoot had become greatly and uniformly thickened, and were covered with a whitish "bloom." These galls are due to the attack of the fungus *Erobasidium japonicum*. (See JOURN. R.H.S. xxxiv., p. 45.) The only remedy is to pick off the galled growths and burn them.

Coloration of Bean seeds.—Mr. Chittenden showed a series of seeds of French Bean grown at Wisley in the past summer from seed shown before the Committee last January, when the earlier history was given. (See JOURN. R.H.S. xxxvi., p. xxv.) The parent seed was the result of an accidental cross in 1907, and the progeny had segregated in 1909. The seeds sown and the seeds produced in 1910 were as follow:—

(a) Parent seeds black: Plant 1 produced 28 black seeds; 25 partly chocolate, partly black; 35 brownish black. Plant 2 produced 52 seeds like parent. Plant 3 produced 285 seeds like parent. Plant 4 produced 46 seeds brownish black.

(b) Parent seeds creamy-white: Plant 1 produced 170 seeds purplish-tinted white, with mottling and spots and streaks of black, 55 black or reddish-black with small spots of purplish-white. Plant 2 produced 100 seeds flesh-white. Plant 3 produced 90 seeds creamy-white, 5 flesh-white.

(c) Parent seeds tan: Plant 1 produced 25 seeds chamois. Plant 2 produced 22 seeds dead-leaf brown with tiny spots of flesh-white; 32 a little lighter than foregoing with large number of spots and blotches of flesh-white, the blotches speckled with ground colour; 7 brownish terra-cotta with tiny spots of flesh-white; 35 terra-cotta with spots and blotches of flesh-white speckled with terra-cotta. Plant 3 produced 72 seeds chamois to dark hazel. Plant 4 produced 115 seeds chamois, more or less mottled with black.

(d) Parent seeds maroon: Plant 1 produced 135 seeds bistre to dark tan. Plant 2 produced 25 seeds purple-black to buff. Plant 3 produced 33 seeds dark steel-blue to lighter purplish-blue. Plant 4 produced 195 seeds purple-black to snuff colour. Plant 5 produced 135 seeds like Plant 2.

(e) Parent seeds reddish-salmon with streaks of burnt umber: Plant 1 produced 173 seeds yellowish-salmon with many streaks of fawn (like parent); 18 seeds fawn, except for few small spots of pale yellowish-salmon. Plant 2 produced 156 seeds like striped ones of Plant 1. Plant 3 produced 170 seeds pale yellowish-salmon with faint grey mottling, striped with burnt umber; 6 wholly burnt umber, except for few small spots of pale yellowish-salmon.

(f) Parent seed pale flesh with streaks of dark neutral tint: Plant 1 produced 85 seeds pale putty to cinnamon. Plant 2 produced 230 seeds pale flesh, mottled and more or less streaked with neutral tint (like parent).

(g) Parent seed chocolate: Plant 1 produced 55 seeds Naples yellow more or less mottled with neutral tint. Plant 2 produced 22 milk-white seeds.

(h) Parent seed violet black with streaks and spots of rosy-white: Plant 1 produced 100 seeds milk-white to creamy-white. Plant 2 produced 9 seeds milk-white; 81 greenish-white. Plant 3 produced 128 seeds with rosy-white ground mottled and streaked with violet-black so that seed appeared purple. Plant 4 produced 195 seeds similar to Plant 3, but less mottled.

(i) Parent seed rosy-white with more or less ivory-black; Plant 1 produced 45 seeds of rosy-white faintly mottled with dilute black and blotched and streaked with violet-black. Plant 2 produced 11 seeds fleshy-white. Plant 3 produced 175 seeds with rosy-white ground, some half, some almost entirely, covered with greenish-black. Plant 4 produced seeds similar to those from Plant 2, but faintly mottled with grey. Plant 5 produced 90 seeds with very pale rosy-white ground mottled with much diluted violet-black and with streaks of violet-black. Plant 6 produced 41 seeds violet-black speckled with rosy-white; 48 violet-black more spotted with rosy-white; 20 seeds neutral tint with small spots of rosy-white; 52 neutral tint with large spots of rosy-white; these differences were not clearly marked, however.

(j) Parent seed burnt umber: Plant 1 produced 370 seeds maroon. Plant 2 produced 90 seeds milk-white faintly mottled. Plant 3 produced 290 seeds fawn. Plant 4 produced 398 seeds maroon.

(k) Parent seed pale flesh with large spots, streaks, and specks of burnt umber: Plant 1 produced 42 seeds pale flesh with streaks of lilac-rose. Plant 2 produced 98 seeds pale flesh, some almost wholly others half covered with tan. Plant 3 produced 48 seeds milk-white; 90 sulphur-white. Plant 4 produced 225 seeds pale flesh spotted with diluted umber and more or less covered with burnt umber, as in Plant 2.

(l) Parent seed chamois faintly mottled: Plant 1 produced 93 seeds cream-yellow to chamois, more or less mottled with olive-brown. Plant 2 produced 74 similarly coloured seeds.

(m) Parent seed pale blush with parts reddish-black: Plant 1 produced 195 seeds purplish-tinted white, much or only half covered with darker spots and blotches. Plant 2 produced 200 seeds milk-white to yellowish-white.

(n) Parent seed dark chocolate-brown with patches of dark fawn: Plant 1 produced 305 seeds fleshy-white with more or less chocolate-brown.

(o) Parent seed chocolate with small spots of rosy-white: Plant 1 produced 36 seeds chocolate. Plant 2 produced 50 seeds chocolate.

SCIENTIFIC COMMITTEE, JANUARY 31, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and ten members present.

Cutting the Common Reed.—A question was raised concerning whether the best practice in cutting the Common Reed *Phragmites communis* was to cut annually or biennially. It was pointed out that in the Norfolk Broads, where this crop is a very valuable one, the practice where the best Reeds were grown was to cut annually, for if they were left longer they became very brittle, and otherwise deteriorated, making the cut sample very irregular.

Cedar cones.—Mr. J. Fraser, F.L.S., showed cones of *Cedrus Libani* and *C. Deodara*. These cones had been collected in August when they were both green. The cone of *C. Libani* was comparatively small, it became brown a month after gathering, and was hollow at the apex. That of *C. Deodara* was heavier and full of resin; it became brown only after two months; the apex of the cone was pointed, and each scale, unlike that of *C. Libani*, was ribbed near the apex.

Double Richardia africana.—Some large and well-marked examples of this well-known phenomenon were sent from Trowbridge.

Fasciation in Marsdenia.—Mr. Bowles showed a fasciated stem of *Marsdenia erecta* from the Rev. Canon Ellacombe, at Bitton. It is rare for an example of fasciation in a plant belonging to the *Asclepiadaceae* to be shown before the Committee. Mr. Worsdell, F.L.S., remarked that he had observed the phenomenon in a *Stapelia* in South Africa.

White Crocus Imperati.—Mr. Bowles drew attention to a white form of *Crocus Imperati* which had occurred among some imported corms, and was shown by Messrs. Barr. The flower showed none of the barring on the outside of the perianth segments usual in this species.

SCIENTIFIC COMMITTEE, FEBRUARY 14, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and sixteen members present.

Variation in Wheat.—Dr. Voelcker showed grains of wheat from plants grown in pots to which had been added successively larger quantities of magnesium oxide. The examples varied much in appearance, from a plump, starchy-looking grain, where the proportion between the calcium and magnesium present in the soil was low, to a

hard-looking grain, where the proportion of the two elements was nearly equal. The nitrogen content varied in the same way, so that it was much higher where the calcium and magnesium content of the soil approached equality than where the calcium content was much in excess of the magnesium. The crop also increased with the increased content of magnesium, until the ratio between calcium and magnesium reached unity. Dr. Voelcker exhibited these specimens to illustrate the influence of the chemical composition of the soil upon the character of a variety. The experiments were carried out in triplicate, and with three different varieties, with similar results. Mr. Elwes, F.R.S., expressed himself in general agreement with Dr. Voelcker's views as to the influence of soil and climate in changing the characters of wheat, and doubted whether the attempts now being made to produce strong wheats for growth in Great Britain would be really successful. He considered, however, that strength as now understood by the miller and baker was a matter of but minor importance to the farmer and consumer.

Hymenocallis macrostephana.—Mr. Elwes showed flowers of this plant (figured in *Botanical Magazine*, t. 6436). *H. macrostephana* is reputed to be a hybrid between *Ismene calathina* and *Hymenocallis speciosa*. Both species are now included in the genus *Hymenocallis*. Mr. Hoog, of Haarlem, some time ago, repeated the cross, and raised the fine form *Hymenocallis* 'Daphne,' very similar to, but finer than the original *H. macrostephana*. See note by Mr. Worsley in "Gardeners' Chronicle," xxix. (1901), p. 72.

Galanthus.—Mr. Elwes also showed a fine and vigorous form of *Galanthus*, which Mr. Bowles thought to be of hybrid origin, and took for further examination.

Dasylirion glaucophyllum.—Mr. Holmes showed portions of a plant of the fodder plant, to which attention was drawn by Dr. Voelcker at a recent meeting, and which was then thought to be a species of *Hechtia*. He was now able to identify it as *Dasylirion glaucophyllum*.

Achillea Millefolium var. *rubra*.—Mr. Fraser showed a dark red form of *Achillea*, similar to that often grown in gardens, which he had found growing wild at Killin, Perthshire.

Polypodium vulgare var. —Mr. Druery, V.M.H., showed a frond of a *Polypodium* very nearly approaching the beautiful variety *cornubiense*, which had been found growing near Barnstaple, North Devon.

Odontioda × *Craveniana*.—Mr. Rolfe, A.L.S., showed flowers of this hybrid, raised by Messrs. Charlesworth, between *Cochlioda Noezliana* ♀, from Ecuador, and *Odontoglossum cordatum* ♂, from Mexico, and remarked upon the great differences between the parents. The hybrid was bright scarlet, like the *Cochlioda*.

Fasciated Wallflower.—Mr. E. Knowldin sent from Dublin a fasciated wallflower, which had been growing on a wall. The specimen broadened out and forked at the top of the stem.

SCIENTIFIC COMMITTEE, FEBRUARY 28, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and sixteen members present.

Galanthus hybrid (?).—Mr. Bowles showed drawings of the *Galanthus* exhibited by Mr. Elwes at the last meeting, and reported that in structure and appearance it approached certain hybrids of *G. Elwesii*. He thought it might be a hybrid of that species with *G. caucasicus*, but the characters shown by seedlings which Mr. Elwes, F.R.S., said would probably flower next year would throw further light upon the parentage. Mr. Elwes showed a photograph of a group of plants growing in his garden.

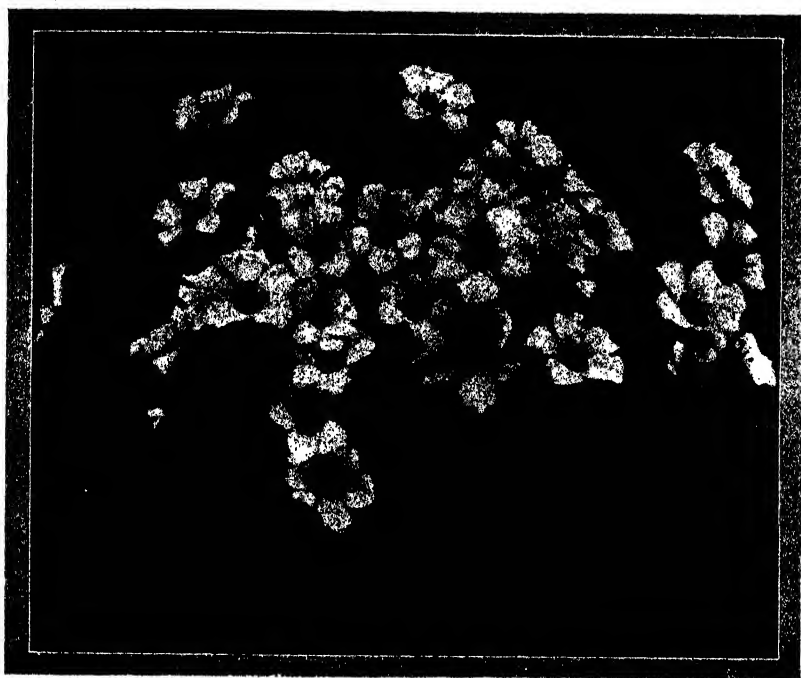


FIG. 69.—*SAXIFRAGA* × *BURSICULATA*. (*Gardeners' Chronicle*.)

Hippeastrum calyptratum.—Mr. Worsley showed flowers of the unspotted form of this species from his garden.

Lopezia racemosa.—Mr. Odell showed flowering shoots of this plant, and commented upon the peculiar method of pollination.

Gall on Willow.—Mr. Fraser, F.L.S., brought stem galls upon *Salix purpurea Lambertiana* similar in appearance and structure to those produced on *S. aurila*, &c., by the dipteran *Cecidomyia salicis*, and which he thought had probably been formed by that insect, although they were usually found attacking only willows.

Hybrid Hippeastrum.—Mr. Elwes showed flowers from plants the result of a cross between *Hippeastrum equestre* and *H. × 'Sir*

William.' The plants flowered at two years of age, and bore red flowers (as usual with *equestre* crosses), varying, however, in shade and markings. Mr. Elwes undertook to report later upon these hybrids when more of the same cross had flowered.

Fasciated Orchid.—Mr. Gurney Wilson, F.L.S., showed a plant of *Brassocattlaelia* × *Fowleri*, in which one of the pseudo-bulbs had forked before flowering, and both forks appeared likely to flower. Mr. Wilson remarked that malformations of plant and flower appeared to be much more frequent in trigeneric hybrids than in crosses between the species.

Narcissus cyclamineus × *N. minimus*.—Mr. Bowles showed a plant of this cross raised by Mr. Chapman.

Saxifraga × *bursiculata*.—A hybrid between *Saxifraga Burseriana* ♀ and *S. apiculata* ♂ came from Mr. Jenkins. The plant was remarkably vigorous and free flowering. In the length of the peduncle, its greenish colour, and in the form of the calyx, the hybrid resembled *S. apiculata*. The whiteness of the corolla and the crimped edges of the petals called to mind *S. Burseriana*, as did the spiny and glaucous characters of the foliage. In the size of the rosettes and the horizontal spreading of the leaves it resembled *S. apiculata*. The other seedlings raised from the same capsule included two yellows, one poor and weedy looking, and 10 plants indistinguishable from *S. Burseriana* (see fig. 69).

Beetle boring bark of Austrian Pine.—Canon Ellacombe sent a piece of the bark of *Pinus austriaca* bored by a beetle, which Canon Fowler reported upon as follows: "The borings of the beetle in the bark of the Austrian Pine are very old, and there is no trace of either beetle or larva to be found. I think it probable, however, that the injury was done by *Hylastes ater*, which attacks various kinds of Pine, both roots and trunk; it is a rather common and widely distributed insect in England, but apparently commoner in Scotland. This is, however, surmise, as it is impossible to be certain; the wood looked as if it had been used for a pergola or fence of some sort, and was quite dry and ancient."

Double Arum.—Miss Musgrave sent a specimen of *Richardia africana* having the leaf next to the inflorescence wholly white except for a slight green mottling. Miss Musgrave said that the same plant had produced similar growths in former years.

Fasciation in Primula malacoides.—The Venerable Archdeacon Donne sent a water-colour drawing of *Primula malacoides* with a fasciated stem.

SCIENTIFIC COMMITTEE, MARCH 14, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and thirteen members present.

Primula sinensis (stellata), abnormalities in.—Mr. Worsley showed flowers of the *stellata* form of *P. sinensis*, having two to five anti-

petalous outgrowths at the throat, the flowers being otherwise normal. The outgrowths were similar in structure to the petals, but only about half the size and reversed, *i.e.* having the dark red surface opposed to the dark red surface of the petals and the paler surface turned towards the centre of the flower (and similar in colour to the outer surface of the corolla).

Green Primroses.—Mr. Fitt, of the Frythe Gardens, Welwyn, showed a well-grown plant of the long-known Primrose with virescent petals. In the present instance the petals showed rather more of the leaf-like character than usual, the venation being very distinct. The plant was found growing wild near Welwyn two years ago.

Rhododendron grande.—Sir John Llewelyn showed flowers from a seedling *Rhododendron grande* gathered in the open. The plant, with others, had been raised from seed received from the late Sir George King, from Calcutta, but had never before flowered, the flower-buds having always previously been destroyed by frost. All the other plants raised at the same time came into flower six weeks later. The instance is interesting as a persistent and apparently congenital variation from the normal time of flowering, independent of climatic conditions. Similar instances occur in other species of *Rhododendron*, particularly *R. arboreum*.

Disease of Celery.—Mr. Chittenden commented upon the widespread character of, and great loss occasioned by, the disease of Celery due to the fungus *Septoria petroselinii* var. *apii* during the past year. He drew attention to the fact that a considerable amount of Celery "seed" on the market, including samples grown in England and on the Continent, showed the perithecia containing ripe spores of the fungus. KLEBAHN has recently shown that the spores from affected "seed" are capable of reproducing the disease, and as so much of the seed seems likely to contain spores, the desirability of paying special attention to Celery during the coming season is indicated. If the foliage shows the least sign of the disease by the development of small brown spots, the plants should be sprayed with potassium sulphide or with Bordeaux mixture at once, the spraying being repeated if necessary. (See p. 115.)

Certificates to plants of scientific interest.—Mr. Worsley brought forward a resolution upon the question of granting certificates to plants shown before the Committee. The fact that the Botanical Certificate had (erroneously) come to be looked upon as an award to be made to a plant of no decorative or commercial value was commented upon. The actual intention of the Botanical Certificate was to encourage the introduction and cultivation of plants of intrinsic interest or of potential value, and it is, as stated in the "Book of Arrangements," intended to be awarded to "Plants newly discovered or raised, and of botanical interest irrespective of decorative value." After further discussion, a sub-committee was re-appointed to select plants at each meeting for the full Committee's consideration, the sub-committee consisting of Messrs. J. T. Bennett-Poë, J. Douglas, C. T. Drury, and A.

Worsley. The further discussion of the question was adjourned until the next meeting.

SCIENTIFIC COMMITTEE, MARCH 28, 1911.

MR. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and fifteen members present.

Jasminum primulinum diseased.—Mr. Odell showed flowering shoots of *Jasminum primulinum* with brown patches here and there upon the stems, and withered foliage above them. The cause of these brown patches was *Botrytis cinerea*, a fungus which, while usually saprophytic, is capable of attacking living tissues and causing death, especially when the growths are sappy.

Crocus Sport.—Mr. Bowles showed a deep-purple sport of *Crocus* 'President,' from the Rev. J. Jacob's garden at Whitchurch. One corn had produced three flowers, the two lateral ones bearing typical 'President,' with colour and striping characteristic of that variety, the middle one being the sport in question, and occurring in the same sheath with the normal flowers.

Pyronia × '*John Seden*.'—Messrs. Veitch sent a fruit of this interesting cross, which Mr. Worsley took for further examination.

Rhododendron Fargesii.—A flowering shoot of this new Chinese *Rhododendron* came from Mr. J. C. Williams, of Caerhays, Cornwall.

Fungi parasitic on insects.—The Secretary, on behalf of Mr. Voss, showed a number of specimens of white fly (*Aleyrodes* sp.) and scale insects attacked by parasitic fungi, sent by Dr. Berger, of the U.S.A. Experiment Station, Florida. In Florida, considerable success has been attained in dealing with insect attacks by spraying trees with water containing spores of fungi parasitic upon the insects. The fungi exhibited were *Aschersonia flavocitrina* on *Citrus* white fly, *A. alcurodes* on white fly, *Aegrita Webberi* on white fly, *Sphaerostilbe coccophila* on Orange scale, and on San José scale, *Verticillium heterocladium* on white fly and scale, *Myriangium Duryi* on San José scale, and *Ophioneutria coccicola* on San José scale.

Botanical Certificate.—The discussion upon Mr. Worsley's motion that a new Certificate was desirable was continued, but the Committee were of opinion that the existing Botanical Certificate and the Certificate of Appreciation covered all the purposes, at present, for which such awards were required. A resolution was therefore sent to the Council suggesting the desirability of restricting the recommendation of the award of the Botanical Certificate to the Scientific Committee.

SCIENTIFIC COMMITTEE, APRIL 11, 1911.

MR. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and twelve members present.

Botanical Certificate.—Mr. Bowles reported that the resolution sent to the Council regarding the Botanical Certificate had been before them with the following result:—

EXTRACT FROM THE MINUTES OF COUNCIL, APRIL 11, 1911.

The following recommendation from the Scientific Committee was read:—

"The Scientific Committee are of opinion that the intention of the award of the Botanical Certificate would be best served if the recommendation of its award were restricted to their Committee, and they respectfully ask the Council to make an ordinance to this effect."

Sir Daniel Morris proposed, Mr. Bowles seconded, and it was carried that with regard to Botanical Certificates the other Committees should recommend to the Scientific Committee any plants they considered worthy of such Certificate, and that the Secretary of the Scientific Committee should subsequently report to the Council what plants had been sent up to them and what they recommended, the Council taking care to inform the several Committees of any awards which they confirmed.

Yellow Clivia.—Mr. R. Hooper-Pearson showed a flower of *Clivia citrina* apparently a form of *C. miniata* which Mr. Worsley said occurred wild in South Africa.

Bomarea.—Mr. Elwes, F.R.S., showed a form of *Bomarea* which he had raised from seed gathered in the Botanic Garden at Rio Janeiro.

Shot-hole Borer.—Mr. Chittenden, F.L.S., showed a piece of plum wood riddled by the shot-hole borer, *Xyleborus dispar*. The beetles were present in great numbers, both males and females, in the proportion of one male to ten or eleven females, as usual arranged in rows in the tunnels. The beetles had caused the death of four plum trees in the garden at Wisley, by boring into the wood.

Malformations of Flowers, &c.—Mr. W. van de Wyre, of Corfe Castle, sent the following floral malformations:—

(1) *Richardia africana* with the leaf below the inflorescence partly white.

(2) *Iris reticulata* with its parts in fours.

(3) Flowers of seedling *Polyanthus* with flowers inside one another, each having both calyx and corolla, and so differing from the ordinary hose in hose form.

(4) Green primrose with stamens foliar and green. The original plant was found wild in Ireland and had been in the possession of the sender for ten years, but had always, until 1911, been single. It had been growing in the same position for three years without division. Now every division of the original plant has developed more or less doubling.

SCIENTIFIC COMMITTEE, APRIL 25, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and eleven members present.

Gongora sp.—Mr. O'Brien, V.M.H., brought forward a species of *Gongora*, introduced by the late Mr. Tracy from Peru. It was apparently a new species, and was referred to Kew.

Oncoba Routledgei Sprague.—Mr. Shea showed flowers and foliage of this newly-introduced greenhouse shrub. The seed had been sent home to Mr. Shea from Central Africa, a fruit having been presented to a friend of his by a native chief as a parting gift, on account of its great value as a means of ridding one of enemies with little trouble. The instruction given was to soak the hard fruit in water and present the decoction to the person to drink. The fruit has therefore probably very poisonous properties. The plant, which belongs to the *Bixineae*, has large showy white flowers, strongly scented, and with numerous yellow stamens. Many of the flowers lacked a pistil. Mr. Shea's plant appears to differ from *O. spinosa* which is a native of Arabia, and the specific name of *Routledgei* is in honour of the sender of the seed. It was unanimously resolved to recommend the award of a Botanical Certificate to the plant on the ground of its novelty and peculiar properties. (Fig. 70.)

Sport in Daffodil.—Mr. Bowles showed flowers of a sport from 'Weardale Perfection,' which had appeared among a group of that variety in Mr. Cranfield's garden. It had a yellow-tinged perianth, and a much deeper yellow trumpet than the type.

Double Primroses, &c.—Messrs. Cocker, of Aberdeen, sent a large number of flowers of double Polyanthus and Primroses which they had raised from seed. The colours ranged from Primrose yellow through white to purplish-blue shades, but were not, as a rule, very bright. They were raised by crossing the Wisley blue Primrose ♀ with the well-known *Polyanthus platypetala plena*. In the second and third generation numerous double-flowered forms had appeared with a wide range of colours. It was unanimously resolved to recommend the award of a Certificate of Appreciation to Messrs. Cocker in acknowledgment of their work in raising these plants.

Rhododendron hybrid.—Sir John Llewelyn showed flowers cut from the open of a seedling *Rhododendron*, raised from *R. Thomsonii* × *R. Aucklandii*. The leaves had something of the blue-green coloration of *R. Thomsonii*, but were devoid of hair beneath, much longer and more acute than those of that plant. The corolla was deep red, and lacked the spotting often seen in *R. Thomsonii*.

Pyronia × *Seden* 'John'.—Mr. Worsley reported that he had examined the fruit of this hybrid shown on March 28, and had failed to find ripe seeds in it. The cells each contained as a rule three undeveloped seeds.

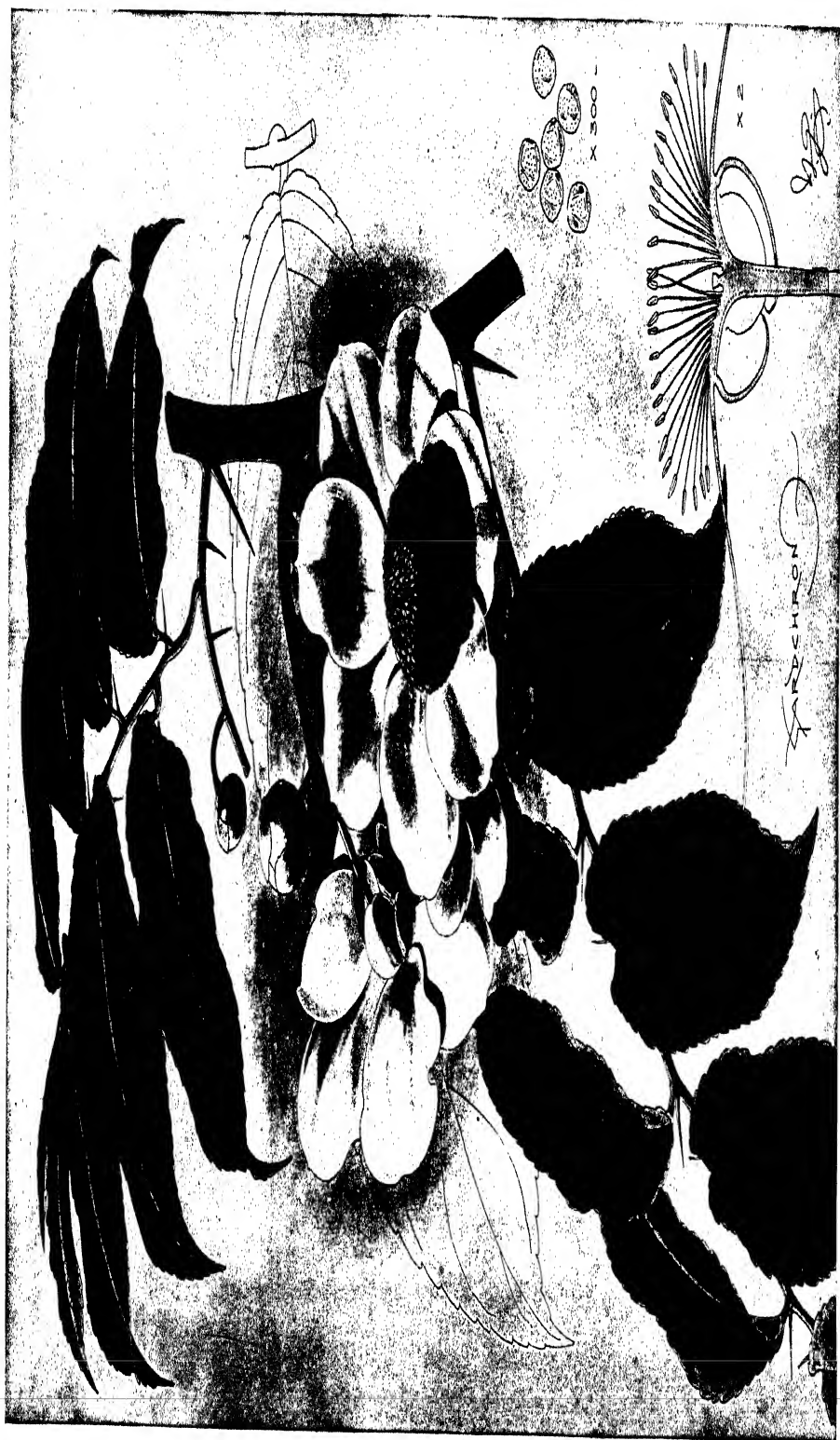


FIG. 70.—*ONCoba rotundifolia*. (*Gardener's Chronicle*.) (pp. xxxiv. and li.)



FRUIT AND VEGETABLE COMMITTEE.

JANUARY 3, 1911.

MR. OWEN THOMAS, V.M.H., in the Chair, and twelve members present.

Awards Recommended :—

Silver Hogg Medal.

To Right Hon. Earl of Harrington, Derby (gr. Mr. Goodacre), for Grapes.

Silver-gilt Knightian Medal.

To Mrs. Denison, Little Gaddesden (gr. Mr. A. G. Gentle), for a collection of Onions.

Silver Knightian Medal.

To Messrs. Peed, Streatham, for a collection of Apples.

Silver Banksian Medal.

To Mr. W. E. Sands, Hillsborough, Ireland, for a collection of Potatos grown as a second crop on a piece of land which had already carried a crop of early Potatos.

To Messrs. Sutton, Reading, for a collection of Christmas Vegetables.

Other Exhibits.

R.H.S. Garden, Wisley: Asparagus from the Wisley Trials.

Mr. W. Poupart, Twickenham: bottled Fruits.

His Grace the Duke of Rutland, Grantham (gr. Mr. Divers): Pear 'St. Stephen.'

FRUIT AND VEGETABLE COMMITTEE, JANUARY 17, 1911.

MR. G. BUNYARD, V.H.M., in the Chair, and nineteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. J. Veitch, Chelsea, for a collection of Apples consisting of one hundred and two varieties.

Silver-gilt Hogg Medal.

To Messrs. G. Bunyard, Maidstone, for a collection of Apples and Pears.

Silver Knightian Medal.

To the Monmouthshire Education Committee for a collection of Potatos.

To Messrs. Seabrook, Chelmsford, for a collection of Apples.

Silver Banksian Medal.

To Messrs. Sutton, Reading, for early Broccolis.

Other Exhibits.

Messrs. Brown, Peterborough: Apple 'Peterborough Pippin.'

Mrs. Miller, Marlow: bottled Fruits.

Mr. Poupart, Twickenham: bottled Fruits.

R.H.S. Garden, Wisley: collection of forced Asparagus.

FRUIT AND VEGETABLE COMMITTEE, JANUARY 31, 1911.

Mr. A. H. PEARSON in the Chair, and eighteen members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Cheal, Crawley, for Apples.

Silver Banksian Medal.

To Messrs. Sutton, Reading, for Onions.

Other Exhibits.

Messrs. Brown, Peterborough: Apple 'Peterborough Pippin.'

Messrs. Laxton, Bedford: seedling Apple.

Mr. E. G. Moon, Mayford: seedling Apple.

Mr. W. Poupart, Twickenham: bottled Fruits.

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 14, 1911.

Mr. G. BUNYARD, V.M.H., in the Chair, and twenty members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Mrs. Denison (gr. Mr. Gentle), Berkhamsted, for a collection of roots and tubers.

To Mr. W. A. Divers, Grantham, for Apples.

To Messrs. Rivers, Sawbridgeworth, for Orange Trees in pots.

Silver Knightian Medal.

To Messrs. Sutton, Reading, for Vegetables.

Silver Banksian Medal.

To Sir Walter Gilbey, Bart., Stansted, for home-made Jams and Lavender Water.

Other Exhibits.

Messrs. Brown, Peterborough: Apple 'Peterborough Pippin.'

Mrs. Miller, Marlow: Chutneys and Pickles.

Rt. Hon. Lord Hillingdon, Hillingdon Court: Apples.

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 28, 1911.

Mr. G. G. A. Nix in the Chair, and fifteen members present.

Awards Recommended :—

Silver Banksian Medal.

To Mrs. Banks, Grosvenor Square, for preserves.

To Messrs. Sutton, Reading, for Kales.

Other Exhibits.

Hon. Vicary Gibbs, Elstree: Apple 'Hoary Morning.'

Sir Walter Gilbey, Bart., Elsenham: Jams and Lavender Water.

Countess of Ilchester, Kensington: Apple 'Holland House Seedling.'

Mr. W. B. Little, Carlisle: Pears.

Mr. W. Poupart, Twickenham: bottled Fruits.

FRUIT AND VEGETABLE COMMITTEE, MARCH 14, 1911.

Mr. C. G. A. Nix in the Chair, and nineteen members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Sutton, Reading, for Vegetables.

Other Exhibits.

Mr. W. H. Honess, Dorking: Cabbage Lettuces.

Mr. A. Poupart, Twickenham: Rhubarb.

FRUIT AND VEGETABLE COMMITTEE, MARCH 28, 1911.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and thirteen members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Sutton, Reading, for early Cabbages.

Other Exhibits.

Messrs. Jefferies, Cirencester: Apples.

Mr. W. Poupart, Twickenham: Rhubarb.

Mr. G. W. Turner, Brasted Chart: forced Chicory.

XXXVIII PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

FRUIT AND VEGETABLE COMMITTEE, APRIL 11, 1911.

Mr. G. BUNYARD, V.M.H. in the Chair, and fifteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Messrs. Sutton, Reading, for Vegetables.

The Hon. Vicary Gibbs (gr. Mr. Beckett), Elstree, sent a basket of Strawberry, 'Royal Sovereign.'

FRUIT AND VEGETABLE COMMITTEE, APRIL 25, 1911.

Mr. G. BUNYARD, V.M.H., in the Chair, and seventeen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Messrs. Sutton, Reading, for Vegetables and Salads.

Silver Banksian Medal.

To Messrs. Dianellos & Vergoupolos, Nicosia, Cyprus, for Oranges.

To Lord Hillingdon (gr. Mr. Shelton), Sevenoaks, for Strawberry, 'Royal Sovereign.'

Bronze Knightian Medal.

To Messrs. Storrie & Storrie, Glencarse, for coloured Borecoles.

FRUIT AND VEGETABLE COMMITTEE, APRIL 27, 1911.

SUB-COMMITTEE AT WISLEY.

Mr. A. DEAN in the Chair, and three members present.

The following produce on trial was Highly Commended (**XXX**):

Asparagus, 'Early Giant French,' from Messrs. J. Veitch, Chelsea.

Asparagus, 'Green Canadian,' from Messrs. Barr, Covent Garden.

Cabbage, 'Sutton's Harbinger,' from Messrs. Sutton, Reading.

Kale, 'True Labrador,' from Messrs. Laxton, Bedford.

FLORAL COMMITTEE.

JANUARY 3, 1911.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-five members present.

Awards Recommended :—*Silver Flora Medal.*

To Rev. H. Buckston, Derby (gr. Mr. Sharnbrook), for a group of Cyclamen.

To Messrs. Cutbush, Highgate, for Carnations and other flowering plants.

Silver Banksian Medal.

To Messrs. May, Upper Edmonton, for greenhouse ferns.

To Messrs. Rochford, Broxbourne, for Begonias and ferns.

To Messrs. J. Veitch, Chelsea, for greenhouse plants.

Award of Merit.

To Cyclamen 'Mrs. Buckston' (strain), (votes, 14 for, 4 against), from Rev. H. Buckston (gr. Mr. Sharnbrook), Etwell, Derby. A beautiful salmon-pink variety, having broad, fringed petals, and said to be a cross between 'Giant Salmon' and a fringed pink variety. (Fig. 71.)

Other Exhibits.

C. E. Baring Young, Esq., East Barnet: Chrysanthemum 'Queen May.'

Messrs. Cannell, Swanley: Zonal Pelargoniums.

Guildford Hardy Plant Nursery, Guildford: hardy plants.

Misses Hopkins, Shepperton: hardy plants.

Messrs. Low, Bush Hill Park: Carnations and Cyclamen.

Messrs. W. Paul, Waltham Cross: Camellias.

Mr. G. Reuthe, Keston: hardy plants.

Mr. L. R. Russell, Richmond: hardy shrubs.

Messrs. Wells, Merstham: Carnations.

FLORAL COMMITTEE, JANUARY 17, 1911.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-nine members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To Messrs. Cutbush, Highgate, for Carnations, &c.

To Messrs. J. Veitch, Chelsea, for a group of greenhouse plants.

Silver-gilt Banksian Medal.

To Mr. H. Burnett, Guernsey, for Carnations.

Silver Flora Medal.

To Messrs. May, Upper Edmonton, for ferns and flowering plants.

To Mr. L. R. Russell, Richmond, for a group of *Azalea indica*, &c.

Silver Banksian Medal.

To Messrs. Stuart Low, Bush Hill Park, for Carnations.

To Messrs. T. S. Ware, Feltham, for rockwork.

Other Exhibits.

Messrs. Barr, Covent Garden: hardy plants.

Mr. B. Bell, Guernsey: Carnation 'Coronation.'

Messrs. Bide, Farnham: *Primula malacoides*.

Lady Church, Hatfield (gr. Mr. Robinson): Cyclamen.

Guildford Hardy Plant Nursery, Guildford: hardy plants.

Mr. J. Hawkes, Isleworth: Cyclamen 'Pink Pearl.'

Misses Hopkins, Shepperton: hardy plants.

Messrs. Peed, Streatham: Alpines.

Mr. G. Reuthe, Keston: hardy plants.

Messrs. Wells, Merstham: Carnation 'Mary Tolman.'

FLORAL COMMITTEE, JANUARY 31, 1911.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-three members present.

Awards Recommended :—

Gold Medal.

To Messrs. Outbush, Southgate, for a group of forced flowering shrubs.

Silver-gilt Banksian Medal.

To Messrs. Outbush, Highgate, for flowering plants.

To Messrs. J. Veitch, Chelsea, for greenhouse plants.

Silver Flora Medal.

To Mr. H. Burnett, Guernsey, for Carnations.

To Messrs. Stuart Low, Enfield, for Carnations and Cyclamen.

Silver Banksian Medal.

To Messrs. Barr, Covent Garden, for hardy plants.

To Messrs. Cannell, Swanley, for Cinerarias and Zonal Pelargoniums.

To Messrs. Cheal, Crawley, for rock plants.

To Messrs. May, Upper Edmonton, for ferns.

Bronze Banksian Medal.

To Messrs. Ware, Feltham, for rock plants.



FIG. 71.—CYCLAMEN 'MRS. BUCKSTON.' (p xxxix.)

(To face p. xi)



FIG. 74.—*NEPHROLEPIS MARSHALLI* VAR. *COMPACTA* (*Mag.*) (p. li.)

(*Top face* p. xli)

Award of Merit.

To *Adiantum farleyense* var. 'Glory of Moordrecht' (votes, unanimous), from Mr. A. A. Fabius, Redlands Nursery, Emsworth. The account of its origin given was that two years ago a plant of *Adiantum tenerum farleyense*, which variety had generally been considered sterile, was observed to be bearing spores on a few fronds. The spores were sown, and gave rise to the beautiful variety exhibited under the above name. The pinnules are similar to those of *Adiantum tenerum farleyense*, but the fronds are borne on more erect petioles, and the plants are said to succeed in a much lower temperature than that which is necessary for the cultivation of the parent. The new Fern was raised in the nursery of Mr. J. Bier, Moordrecht, Holland. (Fig. 72.)

Other Exhibits.

Messrs. Bees, Liverpool: *Primula malacoides alba*.
 Misses Hopkins, Shepperton: hardy plants.
 Messrs. Phipps & Ireland, Barnham: hardy plants.
 Mr. Reuthe, Keston: hardy plants.
 Messrs. Rochford, Turnford: *Nephrolepis exaltata Rochfordii*.
 Mr. L. R. Russell, Richmond: *Primula obconica*, &c.
 Messrs. Wells, Merstham: Carnations.

FLORAL COMMITTEE, FEBRUARY 14, 1911.

Chairmen { Mr. W. MARSHALL, V.M.H. (Groups).
 { Mr. H. B. MAY, V.M.H. (Committee).

Twenty-five members present.

On the proposal by Mr. May, seconded by Mr. Druery, a vote of condolence was sent to the family of the late Mr. Walker, long a member of the Committee.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Cutbush, Highgate, for flowering plants.
 To Messrs. Sutton, Reading, for Primulas and Tulips.

Silver-gilt Banksian Medal.

To Mr. H. Burnett, Guernsey, for Carnations.
 To Messrs. Cuthbert, Southgate, for forced flowering shrubs.
 To Messrs. J. Veitch, Chelsea, for greenhouse plants and standard *Azalea indica*.

Silver Flora Medal.

To Mr. Engelmann, Saffron Walden, for Carnations.
 To Messrs. May, Upper Edmonton, for epiphytal ferns.
 To Messrs. W. Paul, Waltham Cross, for Camellias.

Silver Banksian Medal.

To Messrs. Cannell, Swanley, for Cinerarias and Zonal Pelargoniums.

To Messrs. Mount, Canterbury, for Roses.

To Mr. L. R. Russell, Richmond, for Azaleas, &c.

Bronze Flora Medal.

To Messrs. Cheal, Crawley, for hardy plants.

To Mr. Prichard, Christchurch, for hardy plants.

To Messrs. Wallace, Colchester, for hardy plants.

To Messrs. T. S. Ware, Feltham, for hardy plants.

Bronze Banksian Medal.

To Mr. G. Reuthe, Keston, for hardy plants.

Award of Merit.

To Carnation 'Coronation' (votes, 16 for), from Mr. B. Bell, Guernsey. A new seedling Carnation having Rose-Neyron red flowers of medium size. Slightly scented; calyx non-splitting; flower stems inclined to be weak.

Other Exhibits.

Miss Anson, Streatham: flower paintings.

Messrs. Barr, Surbiton: hardy plants.

Mr. H. Chapman, Rye: Freesias.

Mr. H. Dixon, Wandsworth Common: *Primula obconica* fl. pl. Spencer Park strain.

Messrs. Heath, Cheltenham: hardy plants.

Misses Hopkins, Shepperton: hardy plants.

Messrs. S. Low, Enfield: Carnations and Cyclamens.

Messrs. Peed, Streatham: hardy plants.

Mr. Pulham, Elsenham: hardy plants.

Messrs. Wells, Merstham: Carnations.

Messrs. Whitelegg & Page, Chislehurst: *Primula malacoides*.

FLORAL COMMITTEE, FEBRUARY 28, 1911.

Chairmen { Mr. W. MARSHALL, V.M.H. (Groups).
 { Mr. H. B. MAY, V.M.H. (Committee).

Twenty-eight members present.

Awards Recommended :—

Gold Medal.

To Mr. L. R. Russell, Richmond, for Indian Azaleas.

To Messrs. J. Veitch, Chelsea, for forced flowering shrubs, standard Azaleas, and miscellaneous greenhouse plants.

Silver-gilt Flora Medal.

To Messrs. Cutbush, Highgate, for miscellaneous flowering plants and cut flowers.

To Miss Gundry, Foots Cray, Kent, for flower paintings.
 To St. George's Nursery, Harlington, for Cyclamen.
 To Lady Tate (gr. Mr. Howe), Streatham Common, for bulbous plants.

Silver-gilt Banksian Medal.

To Messrs. Hill, Lower Edmonton, for ferns.
 To Messrs. May, Upper Edmonton, for filmy ferns.
 To Mr. Seward, Hanwell, for Cyclamen.

Silver Flora Medal.

To Mr. H. Burnett, Guernsey, for Carnations.
 To Messrs. Cuthbert, Southgate, for forced flowering shrubs.
 To Mrs. Leschallas (gr. Mr. Farmer), Windlesham, for *Richardia Elliottiana*.

To Messrs. Stuart Low, Bush Hill Park, for Carnations.
 To Mr. Reuthe, Keston, for hardy plants.

Silver Banksian Medal.

To Messrs. Barr, Covent Garden, for hardy plants.
 To Mr. A. F. Dutton, Iver, for Carnations.
 To Mr. C. Engelmann, Saffron Walden, for Carnations.
 To Hon. Vicary Gibbs (gr. Mr. Beckett), Aldenham, for Cyclamen.
 To Messrs. Mount, Canterbury, for Roses.
 To Messrs. Peed, Streatham, for Lachenalias and alpine plants.
 To Mr. M. Prichard, Christchurch, for hardy plants.
 To Messrs. Sutton, Reading, for Tulips.
 To Messrs. Ware, Feltham, for small rockery.

Bronze Flora Medal.

To Messrs. Cannell, Swanley, for Zonal Pelargoniums, Cinerarias, and Cyclamen.
 To Messrs. Clark, Dover, for hybrid Primroses.
 To Messrs. Gill, Falmouth, for hardy plants.

Bronze Banksian Medal.

To Messrs. Bakers, Codsall, for hardy plants.

First-class Certificate.

To *Primula Winteri* (votes, 18 for), from Messrs. R. Gill, Falmouth. A beautiful new dwarf Primula, found at an elevation of 12,000 feet on the Himalaya. It has proved hardy at Falmouth, and is remarkably free-flowering in habit. The flowers are about as large as the common Primrose, bright Ageratum blue in colour, with a zone of white round the eye. Both colour and size of flower showed some variation. Pin-eyed and thrum-eyed flowers were exhibited. The edges of the petals are serrated, and the spatulate, farinose leaves are about 2 inches broad at the widest part and 2½ inches long. (Fig. 75.)

Award of Merit.

To *Saxifraga* × *bursiculata* (votes, unanimous), from Mr. E. H. Jenkins, Hampton Hill. This Saxifrage is the result of a cross between *S. Burseriana major* and *S. apiculata*. The flowers are large pure white, and are borne in trusses on green peduncles after the manner of *S. apiculata*. The crimping of the petals and the spiny nature of the slightly glaucous foliage resemble *S. Burseriana major*. The plant has great vigour, and the rosettes of leaves have the characteristic spreading habit of *S. apiculata*. (See p. xxx and fig. 69.)

Other Exhibits.

Messrs. Bath, Wisbech: forced bulbs.

Messrs. Brooks, Basingstoke: Primulas.

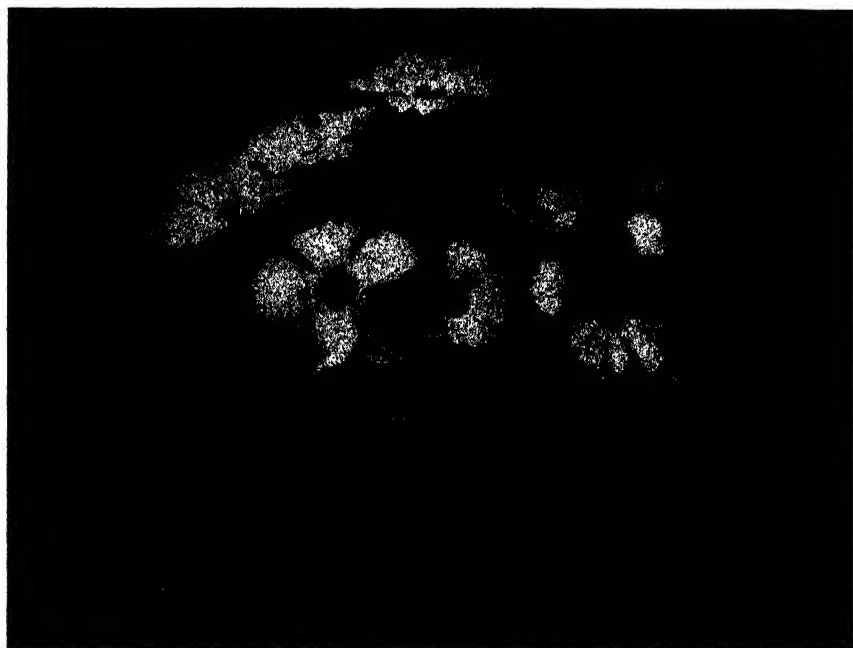


FIG. 75.—*PRIMULA WINTERI*. (*Garden*.)

Mr. Chapman, Rye: Irises, &c.

Messrs. Cheal, Crawley: hardy plants.

Mr. J. Douglas, V.M.H., Bookham: *Primula megaseaeifolia*.

Guildford Hardy Plant Nursery, Guildford: hardy plants.

Messrs. Heath, Cheltenham: hardy plants.

Mr. Hemsley, Crawley: alpine.

Misses Hopkins, Shepperton: hardy plants.

Mrs. Miller, Marlow: flower paintings.

Miss Ough, Streatham Common: flower paintings.

Messrs. Phipps & Ireland, Barnham: hardy plants.

Mr. H. C. Pulham, Stansted: hardy plants.

Royal Botanical Gardens, Glasnevin: *Lachenalias*.
 Mr. R. Sydenham, Birmingham: *Narcissi*.
 Messrs. Wallace, Colchester: hardy plants.
 Mr. H. Ward, Southgate: *Primula malacoides*.
 Messrs. Ware, Feltham: hardy plants.
 Mr. A. Worsley, Isleworth: *Hippeastrum calyptratum*
immaculatum.

FLORAL COMMITTEE, MARCH 14, 1911.

Joint Chairmen { Mr. W. MARSHALL, V.M.H. (Groups).
 { Mr. H. B. MAY, V.M.H. (Committee).

Twenty-eight members present.

Awards Recommended:—

Gold Medal.

To Sir Everard Hambro, K.C.V.O., Hayes, for alpine.

Silver-gilt Flora Medal.

To Mr. H. Burnett, Guernsey, for Carnations.

To Messrs. Carter, Raynes Park, for an ornamental garden.

Silver-gilt Banksian Medal.

To Mr. H. N. Ellison, West Bromwich, for Freesias and Gerberas.

Silver Flora Medal.

To Mr. J. Box, Lindfield, for hardy plants.

To Messrs. W. Paul, Waltham Cross, for flowering shrubs.

To Mr. G. Reuthe, Keston, for hardy plants.

To Mr. L. R. Russell, Richmond, for forced flowering shrubs.

Silver Banksian Medal.

To Messrs. Cannell, Swanley, for Zonal Pelargoniums.

To Messrs. Cutbush, Highgate, for flowering plants.

To Messrs. Gill, Falmouth, for Rhododendrons.

To Messrs. May, Upper Edmonton, for ferns.

To Messrs. Mount, Canterbury, for Roses.

To Mr. Prichard, Christchurch, for hardy plants.

To the Marquis of Salisbury (gr. Mr. Prime), Hatfield, for *Lachen-*
alias.

To Messrs. Sutton, Reading, for Primulas.

To Messrs. Veitch, Chelsea, for greenhouse plants.

To Messrs. Ware, Feltham, for hardy plants.

Bronze Flora Medal.

To Messrs. Cutbush, Southgate, for *Lachenalia Nelsonii*.

To Misses Hopkins, Shepperton, for hardy plants.

To Messrs. G. Paul, Cheshunt, for Lilacs, Roses, &c.

To Messrs. Wallace, Colchester, for hardy plants.

First-class Certificate.

To *Adiantum farleyense* var. 'Glory of Moordrecht' (votes, 14 for, 2 against), from Mr. A. A. Fabius, Emsworth, Hants. This plant received an Award of Merit on January 31, 1911. For description see p. xli.

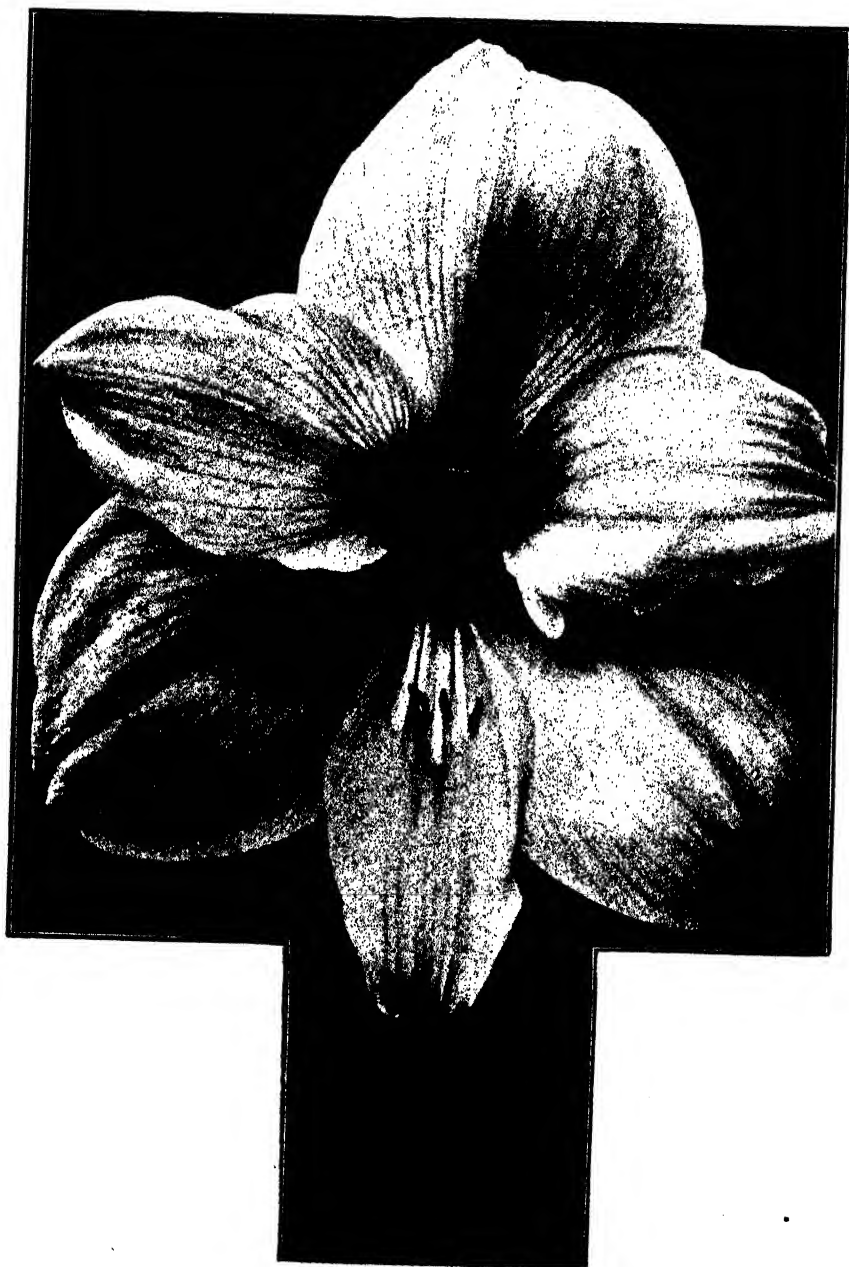


FIG. 76.—HIPPEASTRUM 'QUEEN MARY.' (*Journal of Horticulture*.)

Award of Merit.

To *Hippeastrum* 'Queen Mary' (votes, unanimous), from Messrs. Ker, Liverpool. The plant exhibited was the result of a cross between *Hippeastrum* 'White Lady' and H. 'Silver Queen,' and showed great vigour both in the foliage and in the two handsome flowers, which were about 7 inches across, of a creamy-white colour marked with very pale yellowish-green veins. The bases of the petals were tinged with green. (Fig. 76.)

To *Saxifraga* × *Petrachii* (votes, unanimous), from Sir Everard Hambro, K.C.V.O. (gr. Mr. Grandfield), Hayes. This charming new hybrid is a cross between *S. tombeanensis* and *S. Rocheliana*, and has pure white flowers borne in threes or fours on stems 2 inches high, which rise from compact glaucous rosettes of foliage. (Fig. 73.)

Cultural Commendation.

To the Earl of Clarendon (gr. Mr. Harris), Watford, for Violets.

Other Exhibits.

- Messrs. Bakers, Codsall: hardy plants.
- Messrs. Barr, Covent Garden: hardy plants.
- Messrs. Blackmore & Langdon, Bath: Polyanthus.
- Miss Bubb, Heathfield: Helleborus seedlings.
- Cambridge Botanic Gardens: *Bomarea palococensis*. (F.C.C. Oct. 10, 1893.)
- Messrs. Clark, Dover: hardy plants.
- Mr. C. Elliott, Stevenage: hardy plants.
- Mr. C. Engelmann, Saffron Walden: Carnations.
- Messrs. Fairbairn, Carlisle: Carnation 'The Geisha.'
- Mr. Fitt, Welwyn: *Primula vulgaris viridiflora*.
- Guildford Hardy Plant Nursery: hardy plants.
- Messrs. Heath, Cheltenham: hardy plants.
- Mr. H. Hemsley, Crawley: hardy plants.
- Mr. C. H. Herbert, Birmingham: *Saxifraga oppositifolia major*. (A.M. Mar. 10. 1896.)
- Messrs. Jackman, Woking: hardy plants.
- Mr. G. Lange, Hampton: Carnation 'Alma Ward.'
- Messrs. S. Low, Bush Hill Park: Carnations, &c.
- Messrs. Peed, Streatham: hardy plants.
- Mr. H. C. Pulham, Stansted: hardy plants.
- R. Graham Vivian, Esq., Blackpyl: Rhododendrons.
- W. A. Watts, Esq., St. Asaph: Primroses.
- Messrs. Westcott, Starcross: Violet 'Queen Mary.'

FLORAL COMMITTEE, MARCH 28, 1911.

Joint Chairmen { Mr. W. MARSHALL, V.M.H. (Groups).
 { Mr. H. B. MAY, V.M.H. (Committee).

Twenty-eight members present.

Awards Recommended :—

Gold Medal.

To Messrs. Veitch, Chelsea, for forced shrubs and miscellaneous greenhouse plants.

Silver-gilt Banksian Medal.

To Mr. H. Burnett, Guernsey, for Carnations.

To Messrs. Cutbush, Highgate, for Carnations and hardy plants.

Silver Flora Medal.

To Messrs. Cuthbert, Southgate, for forced shrubs.

To Messrs. S. Low, Bush Hill Park, for Carnations, &c.

To Mr. Prichard, Christchurch, for hardy plants.

To Mr. Reuthe, Keston, for alpinas and shrubs.

Silver Banksian Medal.

To Messrs. May, Upper Edmonton, for Clematis.

To Messrs. Mount, Canterbury, for Roses.

To Mr. G. Prince, Longworth, for Roses.

Bronze Floral Medal.

To Messrs. Barr, Covent Garden, for hardy plants.

To Messrs. Clark, Dover, for hardy plants.

To Mr. Ellison, West Bromwich, for ferns and Gerberas.

To Mr. Engelmann, Saffron Walden, for Carnations.

To Messrs. Gill, Falmouth, for Rhododendrons.

To Messrs. Heath, Cheltenham, for hardy plants.

To Messrs. Wallace, Colchester, for hardy plants.

To Messrs. Ware, Feltham, for hardy plants.

Bronze Banksian Medal.

To Messrs. Cheal, Crawley, for hardy plants.

To Mrs. Harvey, Slough, for sprays of Fortune's Yellow Rose.

To Mr. L. R. Russell, Richmond, for forced shrubs.

Award of Merit.

To Carnation 'Empire Day' (votes, 15 for, 6 against), from Mr. A. Smith, Enfield Highway. This new perpetual flowering variety is very vigorous in growth and exhibits to a remarkable degree the tree habit. The flowers are large, slightly scented, perfect in shape and of a delightful salmon colour. The calyx does not burst and the blooms are borne in great abundance on long stiff stems. (Fig. 77.)

To Rhododendron 'Mrs. Kingsmill' (votes, 17 for), from Miss Mangles, Seale, Surrey. This beautiful variety has creamy white

flowers 3 inches in diameter and is the result of a cross, obtained by the late J. H. Mangles, Esq., between *R. Aucklandii* and *R. campylocarpum*. The flowers, which somewhat resemble in shape and size those of the latter parent, are borne in large trusses contrasting well with the dark green leaves, which are about 5 inches long by $2\frac{1}{4}$ inches

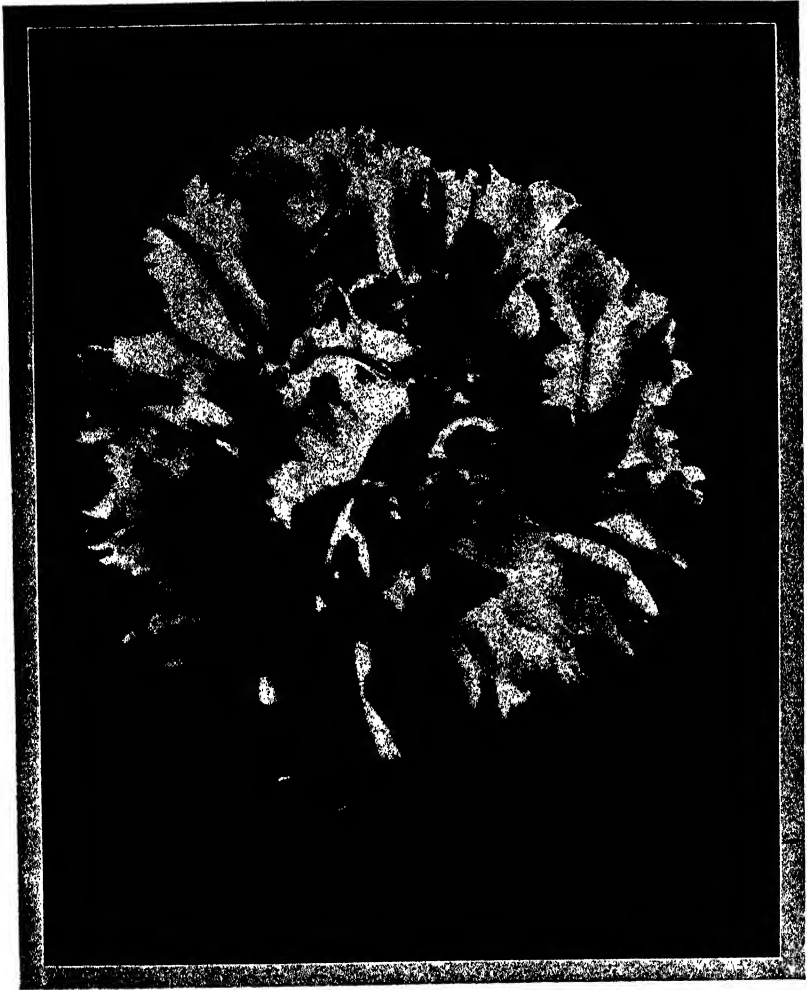


FIG. 77.—CARNATION 'EMPIRE DAY.' (*Gardeners' Magazine*.)
(p. xlviii.)

broad. The plant should prove a valuable addition to the garden, as it flowers freely in the open at Seale in March.

Other Exhibits.

Messrs. Bakers, Codsall: hardy plants.

Mr. J. Box, Lindfield: hardy plants.

Burton Hardy Plant Nurseries, Christchurch: alpiners.

- Messrs. Cannell, Swanley: Zonal Pelargoniums and Cacti.
 Messrs. Carter Page, London Wall: Violas and annuals.
 Mr. A. H. Edwards, Selsey: Hippeastrums.
 Mr. C. Elliott, Stevenage: hardy plants.
 Mr. R. F. Felton, Hanover Square: Carnations.
 Guildford Hardy Plant Nursery, Guildford: hardy plants.
 Mr. H. Hemsley, Crawley: hardy plants.
 Misses Hopkins, Shepperton: hardy plants.
 Messrs. Jackman, Woking: hardy plants.
 S. H. Lane, Esq., Isleworth: Cinerarias.
 Mrs. Marshall, Ambleside: *Primula viscosa* 'Skelwith Fold.'
 Mr. S. Mortimer, Farnham: Carnations.
 Miss Ough, Streatham Common: flower pictures.
 Messrs. G. Paul, Cheshunt: Miniature Roses.
 Messrs. W. Paul, Waltham Cross: Roses.
 Mr. H. C. Pulham, Stansted: hardy plants.
 Captain Rumsey, R.N., Calne: Violet 'Princess of Wales' (A.M.
 1895.)
 Messrs. Young, Cheltenham: Carnations.

FLORAL COMMITTEE, APRIL 11, 1911.

Joint-Chairmen { Mr. W. MARSHALL, V.M.H. (Groups).
 { Mr. H. B. MAY, V.M.H. (Committee).

Twenty-six members present:

Awards Recommended :—

Silver-gilt Flora Medal.

- To Messrs. Cutbush, Highgate, for Carnations and shrubs.
 To Messrs. Veitch, Chelsea, for greenhouse plants and forced trees
 and shrubs.

Silver-gilt Banksian Medal.

- To Mr. H. Burnett, Guernsey, for Carnations.
 To Mr. G. Prince, Longworth, for Roses.

Silver Flora Medal.

- To Messrs. Carter, Raynes Park, for a garden exhibit.
 To Messrs. Cuthbert, Southgate, for forced shrubs.
 To Messrs. Low, Bush Hill Park, for Carnations and New Hol-
 land plants.

Silver Banksian Medal.

- To Messrs. Cannell, Swanley, for Zonal Pelargoniums.
 To Messrs. May, Upper Edmonton, for ferns, &c.
 To Messrs. Mount, Canterbury, for Roses.
 To Mr. W. H. Paine, Kildare, for alpiners.
 To Mr. M. Prichard, Christchurch, for hardy plants.
 To Mr. L. R. Russell, Richmond, for flowering shrubs.

Bronze Flora Medal.

- To Messrs. Clark, Dover, for hardy plants.
- To Messrs. W. Paul, Waltham Cross, for Roses.
- To Mr. G. Routhe, Keston, for hardy plants.
- To Messrs. Ware, Feltham, for alpiners.
- To Messrs. Waterer, Bagshot, for Rhododendrons.

Bronze Banksian Medal.

- To Messrs. Barr, Covent Garden, for hardy plants.
- To Messrs. Blackmore & Langdon, Bath, for Polyanthus.
- To Mr. J. Box, Lindfield, for hardy plants.
- To Mr. Hemsley, Crawley, for hardy plants.
- To Misses Hopkins, Shepperton, for hardy plants.
- To Mr. Turner, Slough, for Rhododendrons.
- To Messrs. Heath, Cheltenham, for hardy plants.

First-class Certificate.

To *Nephrolepis Marshallii compacta* (votes, unanimous), from Messrs. May, Edmonton. A sport from the well-known *N. exaltata* var. *Marshallii*. The light green fronds are divided and subdivided to a very great extent so that the pinnules are almost threadlike, giving the fern a very pleasing mossy appearance. It is compact in habit and is not so liable to lose its characteristics as *N. Marshallii*. (Fig. 74.)

To *Oncoba Routledgei* (votes, unanimous), from C. E. Shea, Esq., The Elms, Foots Cray. A new shrub having spiny shoots and large pure white flowers about $2\frac{1}{2}$ inches across with a bunch of yellow stamens. The leaves are dark green, lanceolate, acute and about 4 inches long by $1\frac{1}{2}$ inch broad. The plant exhibited had been grown in a temperature of 55° F., and was raised from seed sent to England in 1905 by Mr. Jas. Routledge from Mombasa. The large number of unopened buds show the plant to be of a very floriferous character. The fruits, one of which was forming on the plant shown, are about the size of small oranges. (Fig. 70.)

Award of Merit.

To Auricula 'Mrs. Gardner' (votes, 14 for), from Mr. J. Douglas, V.M.H., Great Bookham. A fancy variety with mealy foliage and pale heliotrope flowers of excellent form and having a good paste. (Fig. 78.)

To Auricula 'Mrs. Harry Veitch' (votes, 14 for), from Mr. J. Douglas, V.M.H., Great Bookham. A show variety having old rose flowers with circular lips and a dense white paste. The foliage is mealy.

To Zonal Pelargonium 'Maxim Kovalesky' (votes, 12 for), from Messrs. Cannell, Swanley. An orange-scarlet variety having large flowers and a sturdy habit which renders it very suitable for bedding.

To Rose 'Marcella' (votes, unanimous), from Messrs. W. Paul, Waltham Cross. A large delicately scented Hybrid Tea with pale flesh-coloured blooms having a tinge of gold at the base of the petals.

The buds are long and pointed and the shoots and foliage are of exceptional vigour. (Fig. 79.)

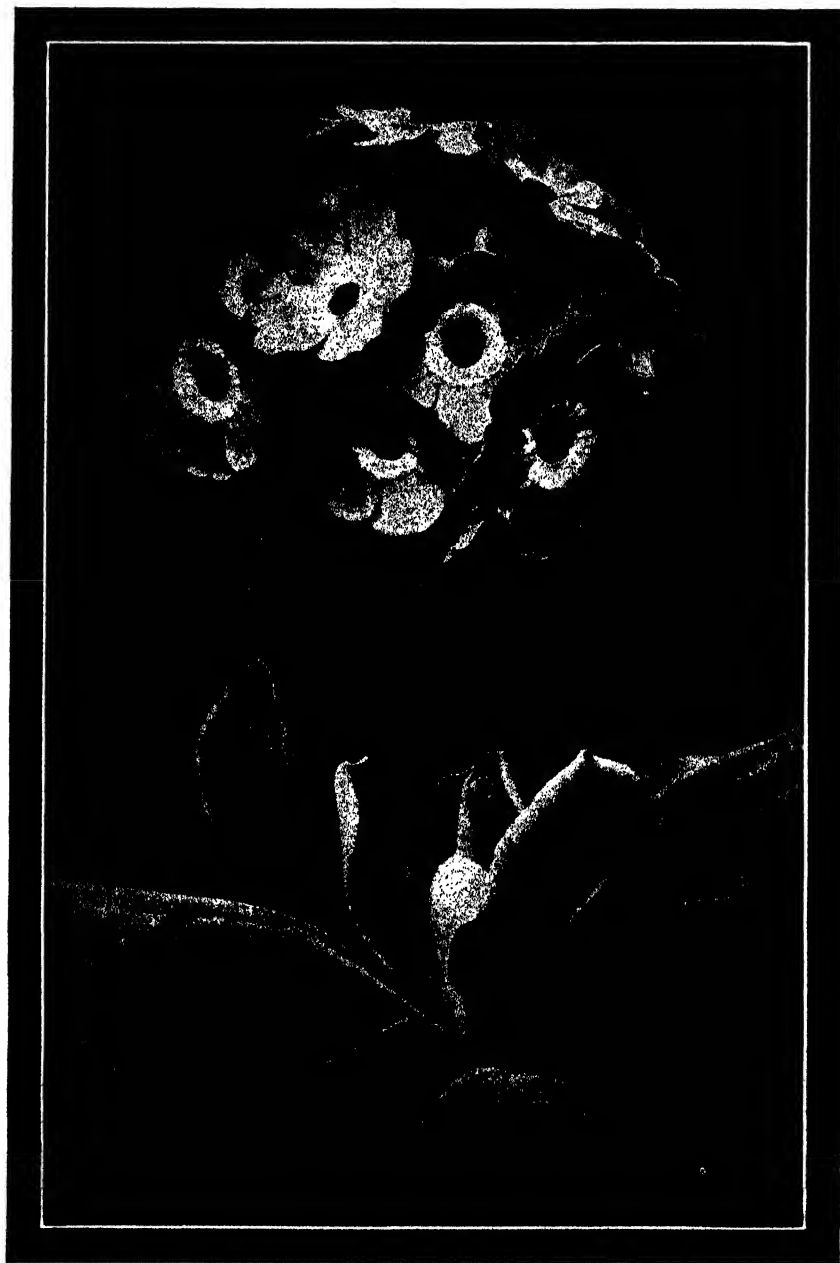


FIG. 78.—AURICULA 'MRS. GARDNER.' (*Gardeners' Magazine.*) (p. li.)

Other Exhibits.

Messrs. Bakers, Codsall: hardy plants.

Messrs. Carter Page, London Wall: Violas and annuals.

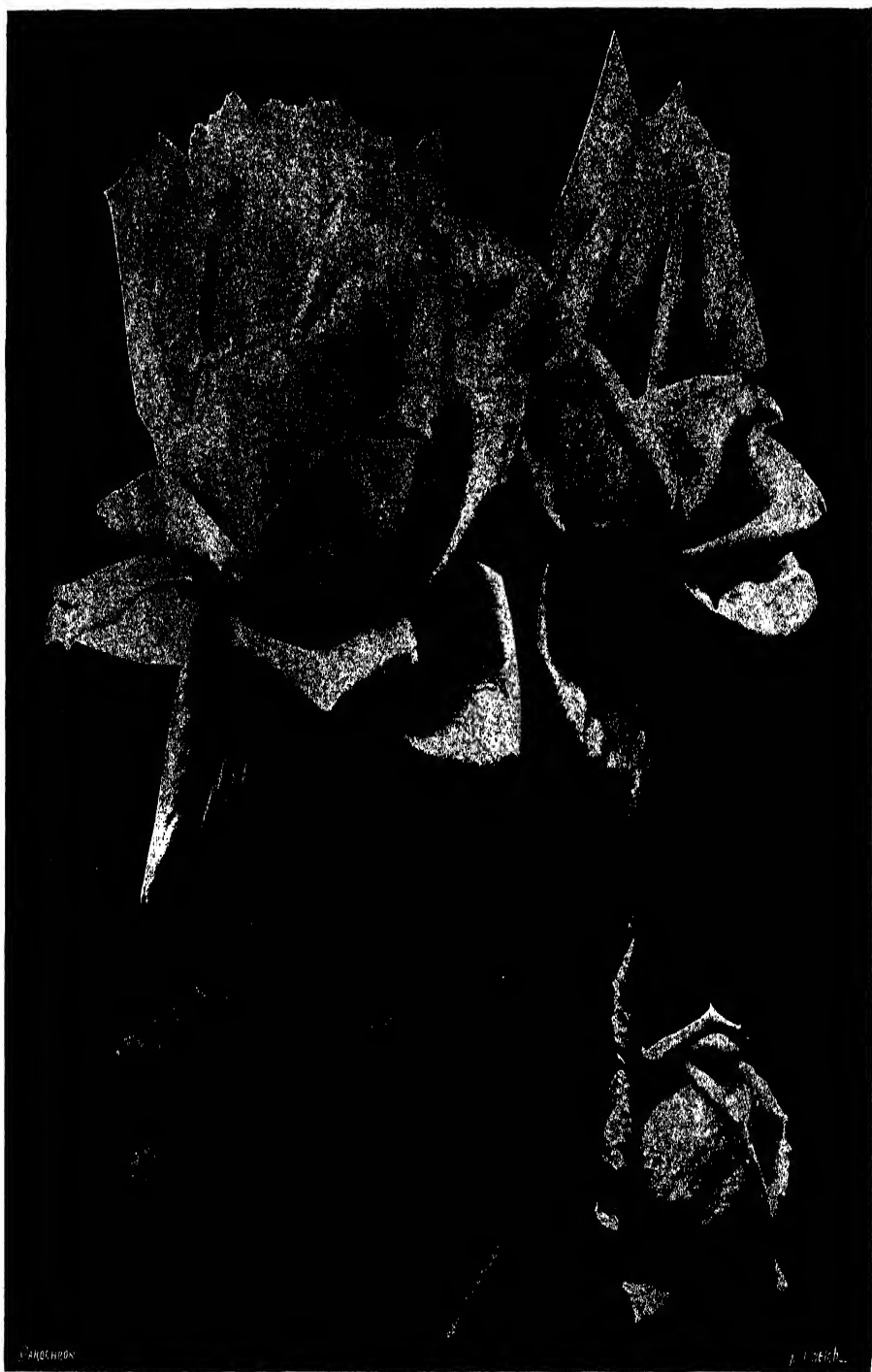


FIG. 79.—ROSE 'MARCELLA,' (*Gardeners' Chronicle*.) (p. lii.)

(To face p. lii.)



- Mr. C. Elliott, Stevenage: alpines.
 Mr. Ellison, West Bromwich: Gerberas and ferns.
 Guildford Hardy Plant Nursery, Guildford: hardy plants.
 Mr. J. Harwood, Seaford: *Anthurium Scherzerianum* Harwoodii.
 Misses Le Lacheur and Sherris, Henfield: Polyanthus, etc.
 P. Maw, Esq., Henley: *Chionodoxa Luciliae alba* (A.M. Mar. 9, 1897).
 Messrs. Peed, West Norwood: Caladiums.
 Mr. H. C. Pulham, Stansted: hardy plants.
 Messrs. Rivers, Sawbridgeworth: Oranges in flower.
 Mr. V. Slade, Taunton: Zonal Pelargoniums.
 Mr. W. A. Watts, St. Asaph: Primroses and Polyanthus.
 Messrs. Young, Cheltenham: Carnations.

FLORAL COMMITTEE, APRIL 25, 1911.

Joint Chairmen { Mr. W. MARSHALL, V.M.H. (Groups).
 { Mr. H. B. MAY, V.M.H. (Committee).

Twenty-six members present.

Awards Recommended :—

Gold Medal.

To Messrs. Cutbush, Highgate, for hardy plants.

Silver-gilt Flora Medal.

To Messrs. Mount, Canterbury, for Roses.

Silver-gilt Banksian Medal.

To Mr. H. Burnett, Guernsey, for Carnations.

Silver Flora Medal.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. Garraway, Bristol, for Schizanthus.

To Messrs. Low, Bush Hill Park, for Carnations, etc.

To Messrs. W. Paul, Waltham Cross, for Roses.

To Mr. Prichard, Christchurch, for hardy plants.

To Mr. L. R. Russell, Richmond, for Cytisus and Salvias.

To Messrs. Storrie & Storrie, Glencarse, for coloured Borecoles.

To Messrs. J. Veitch, Chelsea, for Cinerarias.

Silver Banksian Medal.

To Burton Hardy Plant Nursery, Christchurch, for hardy plants.

To Messrs. Cannell, Swanley, for Zonal Pelargoniums.

To W. James, Esq. (gr. Mr. Smith), Chichester, for Schizanthus

To Messrs. May, Upper Edmonton, for flowering plants.

To Mr. C. Turner, Slough, for Rhododendrons and Auriculas.

To Messrs. Ware, Feltham, for hardy plants.

Bronze Flora Medal.

To Messrs. Cuthbert, Southgate, for Azaleas.
 To H. Little, Esq., Twickenham, for Clivias.
 To Mr. G. Prince, Longworth, for Roses.
 To Mr. G. Reuthe, Keston, for hardy plants.

Bronze Banksian Medal.

To Messrs. Clark, Dover, for hardy plants.
 To Messrs. Jackman, Woking, for hardy plants.
 To Mr. A. Perry, Enfield, for hardy plants.
 To Messrs. Phillips & Taylor, Bracknell, for Primulas and Auriculas.

Cultural Commendation.

To W. James, Esq. (gr. Mr. Smith), Chichester, for Schizanthus.

Award of Merit.

To Auricula 'Umpire' (votes, 15 for), from Mr. J. Douglas, V.M.H., Great Bookham. A fine chestnut-red show variety with a white, regular but rather narrow paste.

To *Primula obconica* 'Chenies Excelsior' (votes, 11 for, 4 against), from Adeline, Duchess of Bedford (gr. Mr. J. Dickson), Woodside House, Chenies. A large and handsome crimson variety of the well-known *P. obconica*.

To Rhododendron 'Pengaer' (votes, 11 for, 2 against), from Sir John T. D. Llewelyn, Bart., Swansea. A cross between *R. Thomsonii* and *R. Griffithianum* having large, handsome crimson-red flowers nearly 3½ inches in diameter and leaves 6 inches long by 2½ inches broad. The hybrid, of which *R. Thomsonii* was the seed parent, has been growing in the open in Wales for 20 years.

Other Exhibits.

Messrs. Bakers, Codsall: hardy plants.
 Messrs. Barr, Covent Garden: hardy plants.
 Mr. J. Box, Lindfield: hardy plants.
 Messrs. Carter Page, London Wall: Violas and annuals.
 Messrs. Cheal, Crawley: hardy plants.
 Messrs. Cocker, Aberdeen: Primroses and Polyanthus.
 Messrs. Dickson, Brown & Tait, Manchester: Polyanthus 'Sunshine.'
 Messrs. Eggett, Thames Ditton: hardy plants.
 Mr. C. Elliott, Stevenage: hardy plants.
 Mr. Ellison, West Bromwich: Gerberas and ferns.
 Guildford Hardy Plant Nursery, Guildford: hardy plants.
 Mr. H. Hemsley, Crawley: hardy plants.
 Misses Hopkins, Shepperton: hardy plants.

Mr. W. Jenkins, Farnham: Geranium 'Emmeleine.'

Mr. T. W. Moore, Glasnevin: *Solandra Hartwegii*.

Mrs. Oppenheim, Windsor: Gerberas.

Messrs. Peed, West Norwood: hardy plants.

Mr. V. Slade, Taunton: Zonal Pelargoniums.

Mr. R. Staward, Hertford: *Primula cashmeriana* hybrids.

Messrs. Wallace, Colchester: hardy plants.

ORCHID COMMITTEE.

JANUARY 3, 1911.

Mr. J. GURNEY FOWLER in the Chair, and sixteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for a large group of *Cypripediums*, including 500 plants of about 200 varieties.

Silver-gilt Flora Medal.

To R. G. Thwaites, Esq., Chessington, Streatham (gr. Mr. J. M. Black), for hybrid *Cattleyas*, *Odontiodas*, &c.

Silver Flora Medal.

To Messrs. J. Cypher, Cheltenham, for *Cypripediums*.

To Messrs. Stuart Low, for a group.

Silver Banksian Medal.

To Messrs. Jas. Veitch, Chelsea, for hybrid *Cypripediums*.

First-class Certificate.

To *Laeliocattleya* × *Cranslounae*, Westonbirt variety (*C. Harrisoniana* × *L. tenebrosa*, Walton Grange variety) (votes, unanimous), from Lieut.-Col. Sir George L. Holford, K.C.V.O. A very fine hybrid with flowers of large size and firm substance. Sepals and petals primrose yellow; lip white with a veined rose-purple blotch on each side of the tube. The spike bore six flowers. (Fig. 80.)

Award of Merit.

To *Odontioda* × *Cooksoniae* (*C. Noezliana* × *O. × ardentissimum*) (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis). Flowers deep blood-red with a faint indication of white on the margins of the petals, and a pale rose tint on the lip.

Cultural Commendation.

To Mr. J. Davis (gr. to J. Gurney Fowler, Esq.), for a fine specimen of *Cypripedium* × *chrysotoxum* 'Victor' with nine flowers.

Other Exhibits.

J. Gurney Fowler, Esq. : *Cypripedium* × *Leeanum* var. 'J. Gurney Fowler.'

Lieut.-Col. Sir George L. Holford, K.C.V.O. : hybrid *Cypripedium*.

Francis Wellesley, Esq. : three new *Cypripediums*.

H. S. Goodson, Esq. : *Odontoglossums*.

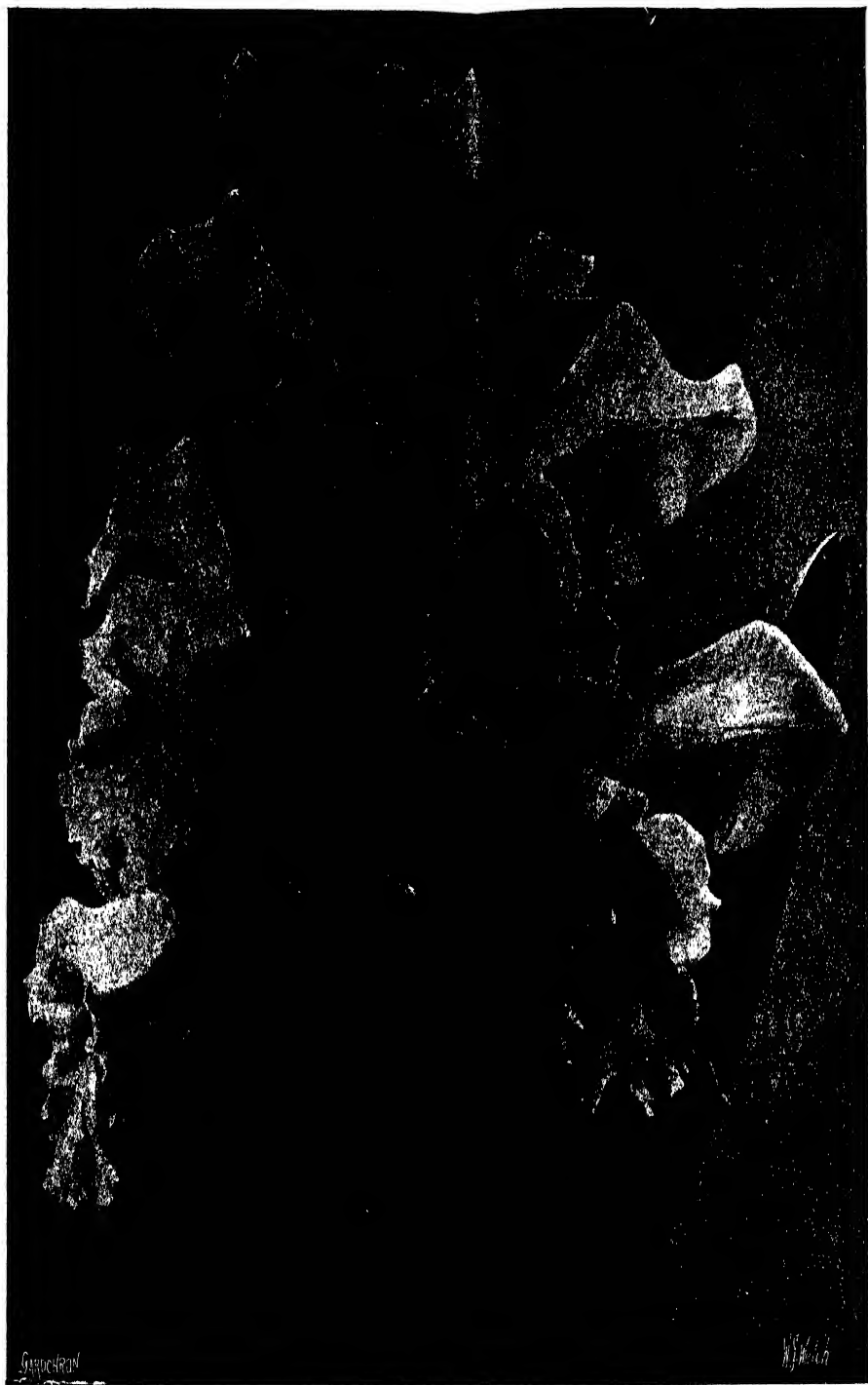


FIG. 80.—*LAELIOCATTLEYA* × *CRANSTOUNAE*, WESTONBIET VARIETY. (*Gardeners' Chronicle*.) (p. lvi.)

[To face p. lvi.]

Messrs. McBean: *Odontoglossum crispum Canoniae*.

Messrs. Sander: *Cypripedium* × 'Goliath.'

Sir John Edwards-Moss: abnormal flowered *Odontoglossum*.

The Royal Horticultural Society: *Phaiocalanthe* × *Sedenii*.

ORCHID COMMITTEE, JANUARY 17, 1911.

Mr. J. GURNEY FOWLER in the Chair, and twenty-two members present.

Awards Recommended:—

Gold Medal.

To Messrs. Charlesworth, for hybrid *Odontoglossums* and other Orchids.

Silver-gilt Banksian Medal.

To Mrs. Norman Cookson, Oakwood, Wylam (gr. Mr. Chapman). for hybrids.

Silver Flora Medal.

To Messrs. Sander, for a group.

To Messrs. Stuart Low, for a group.

To Messrs. McBean, for varieties of *Laelia anceps*, &c.

To Messrs. J. Cypher, for *Cypripediums*.

To Mr. E. V. Low, for a group.

Silver Banksian Medal.

To Messrs. Mansell & Hatcher, for a group.

To Mrs. Lubbock, West Byfleet, for *Dendrobiums*.

To Edward Roberts, Esq., Eltham, for *Cypripediums*.

To Mr. G. W. Miller, Wisbech, for a group.

First-class Certificate.

To *Cypripedium* × 'Vogelzang' ('Hera' *Mariae* × *Hitchinsiae*) (votes, unanimous), from Monsieur Firmin Lambeau, Brussels. A very fine flower with the features of *C.* × 'Hera Euryades.' Dorsal sepal, white spotted with claret-colour. Lip and petals yellow, tinged and veined with pale purple. Shown as *C. Elizabethae*, Vogelzang variety, but the name *Elizabethae* had been previously appropriated. (Fig. 81.)

Award of Merit.

To *Odontoglossum* × *Halseyanum* (parentage unknown) (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis). In appearance like a good, blotched *O. crispum*. Flowers white; heavily blotched with claret.

To *Odontoglossum* × *rosefieldiense* (*Harryanum* × *Lambeauianum*) (votes, unanimous), from de B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. Stables). A very fine hybrid with equally broad segments.

Ground colour, white, finely blotched with reddish purple of varying tints.

To *Cypripedium* × 'Charles Sladdin' (*glaucophyllum* × *bellatulum*) (votes, 12 for, 2 against), from Messrs. Sander, St. Albans. A

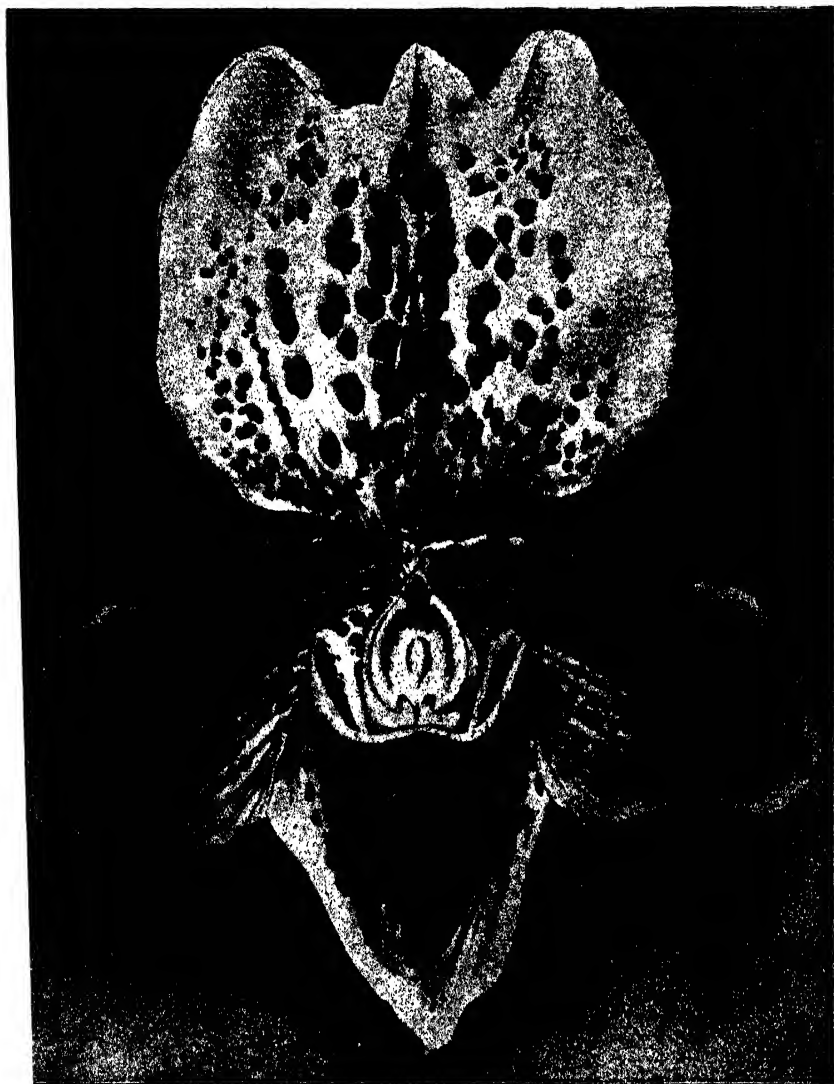


FIG. 81.—*CYPRIPEDIUM* × 'VOGELZANG.' (*Gardeners' Chronicle.*) (p. lvii.)

well-rounded flower, white closely veined with claret colour, the lip being spotted with purple.

To *Odontoglossum* × *Godmanii* (*Edwardii* × *Rolfeae*) (votes, unanimous), from F. Du Cane Godman, Esq., South Lodge, Horsham. Inflorescence branched, flowers rose-purple with yellow crest.

Botanical Certificate.

To *Bulbophyllum galbinum*, from Sir Jeremiah Colman, Bart., V.M.H. (gr. Mr. Collier). Allied to *B. Reinwardtii*. Flowers pale green with some dark markings. Lip hinged, fleshy, deep crimson.

To *Collabium nebulosum*, from Sir Jeremiah Colman, Bart. Inflorescence erect. Flowers spirally arranged and curious in structure. Whitish with brown sepals.

Other Exhibits.

R. G. Thwaites, Esq., hybrids (vote of thanks).

Francis Wellesley, Esq.: *Cypripediums*.

H. S. Goodson, Esq.: *Odontiodas*.

G. P. Walker, Esq.: *Brassolaelia*.

Monsieur Mertens: *Odontoglossums*.

Messrs. Heath: *Cypripediums*.

Sir Jeremiah Colman, Bart., V.M.H.: rare Orchids.

ORCHID COMMITTEE, JANUARY 31, 1911.

MR. HARRY J. VEITCH in the Chair, and seventeen members present.

Awards Recommended:—*Silver-gilt Banksian Medal.*

To Messrs. Charlesworth. for hybrid *Odontoglossums*, and white *Laelia anceps*.

Silver Flora Medal.

To Messrs. Sander, for a group of species and hybrids.

To H. S. Goodson, Esq. (gr. Mr. G. E. Day), for a group.

Silver Banksian Medal.

To Messrs. Armstrong & Brown, for *Cypripediums*.

To Messrs. Stuart Low, for a group.

To Messrs. J. Cypher, for *Cypripediums*.

First-class Certificate.

To *Odontoglossum crispum* 'Peacock' (votes unanimous), from Lieut.-Colonel Sir George L. Holford, K.C.V.O., Westonbirt (gr. Mr. H. G. Alexander). A fine white flower with uniform crimson-purple blotches in the middle of the sepals and petals. Petals and lip fringed, the lip having a chestnut blotch in front of the yellow crest. (Fig. 83.)

To *Odontoglossum* × *Harwoodii* (*Wiganianum* × *maculatum auriferum*) (votes unanimous), from Messrs. Charlesworth, Haywards Heath. A remarkable hybrid with yellow flowers marked with deep purple, the front of the lip white. (Fig. 82.)

Award of Merit.

To *Brassocattleya* × 'Euterpe' (*C. Schilleriana* × *B.-c.* × *Digbyano-Mossiae*) (votes unanimous), from Lieut.-Colonel Sir George

L. Holford, K.C.V.O. Sepals broad, greenish-white, tinged with lilac. Petals and lip pale rosy lilac with greenish disc to the fringed lip.

To *Odontoglossum* × *Mariae* (*Uro-Skinnersi* × 'Queen Alexandra') (votes unanimous), from Messrs. Charlesworth. Sepals and petals greenish, spotted with purple. Lip broad, white spotted with rose-purple.

To *Miltonia Warscewiczii picta* (votes unanimous), from Messrs. Charlesworth. Flowers on a branched inflorescence. Sepals and petals brown, tipped yellow; lip rose-purple with white front.

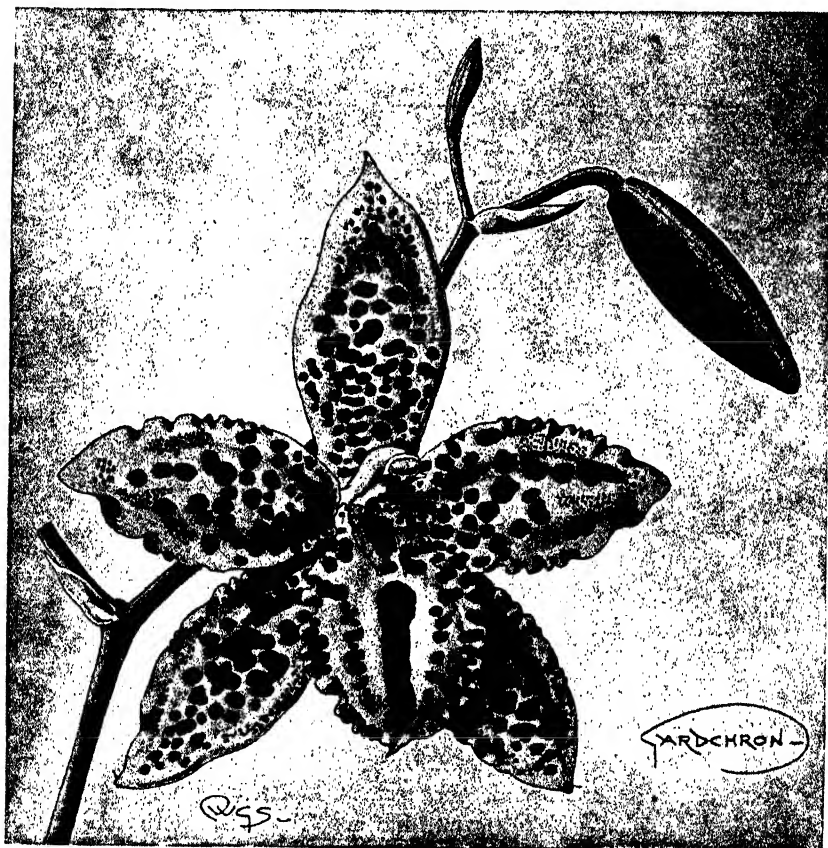


FIG. 82.—*ODONTOGLOSSUM* × *HARWOODII*. (*Gardeners' Chronicle*.) (p. lix.)

To *Cypripedium* × 'Duke of Connaught' ('Beryl' × *nitens*, G. S. Ball's variety) (votes unanimous), from Messrs. Armstrong & Brown, Tunbridge Wells. A good greenish-yellow flower spotted and tinged with dark chocolate purple.

Cultural Commendation.

To Mr. H. G. Alexander, orchid grower to Lieut.-Colonel Sir George L. Holford, K.C.V.O., for a fine specimen of *Laelia anceps Chamberlainiana*, with ten spikes bearing in all twenty-one flowers.





FIG. 83.—*ODONTOGLOSSUM CRISPUM* 'PEACOCK.' (*Gardeners' Chronicle*.) (p. lix.)

(*Typha* p. ix.)

Other Exhibits.

Lieut.-Colonel Sir George L. Holford: hybrids.

Major Rogerson: *Cypripediums*.

Samuel Larkin, Esq.: various Orchids.

Sir Trevor Lawrence, Bart.: *Epicattleya* × *memorale-gigas*.

W. Thompson, Esq.: *Odontoglossum* × 'Clytie' (*Edwardii* × *Pescatorei*).

Edward Roberts, Esq.: *Cypripediums*.

J. S. Moss, Esq.: *Odontoglossum nevadense*.

J. Gurney Fowler, Esq.: *Cypripedium* × 'Mary Beatrice.'

Captain Hope, R.N.: *Arachnanthe Maingayi*.

ORCHID COMMITTEE, FEBRUARY 14, 1911.

Mr. J. GURNEY FOWLER in the Chair, and twenty-one members present.

Awards Recommended:—

Silver-gilt Lindley Medal.

To Lieut.-Colonel Sir George L. Holford, K.C.V.O. (gr. Mr. H. G. Alexander), for a group of *Laelia anceps*.

Silver-gilt Flora Medal.

To Messrs. Charlesworth, for a group, principally hybrids.

Silver Flora Medal.

To Messrs. Stuart Low, for a group.

To Messrs. Armstrong & Brown, for *Cypripediums*.

To Mr. E. V. Low, for a group.

To Messrs. J. Cypher, for *Cypripediums*.

Silver Banksian Medal.

To Messrs. Sander, for a group.

To Messrs. McBean, for *Odontoglossums*, &c.

First-class Certificate.

To *Brassocattleya* × 'Senateur de Bast' (*Digbyano-Mossiae* × 'Mrs. J. Leeman') (votes, unanimous), from Monsieur T. Pauwels, Ghent. Flowers white tinged with rose and near to *B-c.* × *Digbyano-Mossiae*. (Fig. 85.)

Award of Merit.

To *Cypripedium* × 'Carola' (*Thompsoni* × 'Hera Euryades') (votes, unanimous), from Messrs. Hassall, Southgate. Dorsal sepal white, flushed with rose-purple. Petals and lip yellowish tinged with purple.

To *Cypripedium* × *aureum Laekenense* (*Sallieri Hyeaenum* × *Spicerianum*) (votes, 12 for, 4 against), from Mr. E. V. Low,

Haywards Heath. Flowers greenish, tinged with brown, the upper part of the dorsal sepal white.

To *Cymbidium* × *Pauwelsii* (*insigne* × *Lowianum concolor*) (votes unanimous), from Monsieur T. Pauwels. An interesting but rather small-flowered hybrid. Cream with reddish markings.

Botanical Certificate.

To *Xylobium leontoglossum*, from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Flowers in erect spikes, cream colour with reddish markings.

Cultural Commendation.

To Mr. H. G. Alexander, orchid grower to Lieut.-Colonel Sir George L. Holford, K.C.V.O., for a grand specimen of *Cattleya Trianae* 'Hydra,' with 22 spikes bearing together 96 flowers.

Other Exhibits.

Sir Jeremiah Colman, Bart.: *Dendrobium* × 'Lady Colman' and others.

H. S. Goodson, Esq.: rare *Odontoglossums*.

Francis Wellesley, Esq.: *Cypripedium* × *Wellesleyae*.

His Grace the Duke of Marlborough: *Cypripedium bellatulum*.

do Barri Crawshay, Esq.: *Odontoglossums*.

R. G. Thwaites, Esq.: *Soprocattleyas*.

Mr. Jensen: *Cattleya Schröderae*.

ORCHID COMMITTEE, FEBRUARY 28, 1911.

Mr. J. GURNEY FOWLER in the Chair, and sixteen members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Sander, St. Albans, for species and hybrids.

To Messrs. Charlesworth, Haywards Heath, for *Laeliocattleyas*, &c.

To Messrs. Armstrong & Brown, Tunbridge Wells, for *Odontoglossums*, *Cypripediums*, &c.

Silver Banksian Medal.

To Messrs. Mansell & Hatcher, for a group.

To Messrs. McBean, for a group.

To Messrs. J. Cypher, for *Cypripediums*, &c.

To Messrs. Stuart Low, for a group.

Award of Merit.

To *Cymbidium* × *langleyense* (*Lowianum* × *Devonianum*) (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. Flowers in form resembling *C. Lowianum*. Inflorescence semi-pendulous. Flowers green tinged with brown and with a red blotch on the lip.

Botanical Certificate.

To *Platyclinis glumacea valida*, from Sir Trevor Lawrence, Bart., K.C.V.O. (gr. Mr. W. H. White). Flowers in slender racemes, cream white.

To *Dendrobium delicatulum*, from Sir Trevor Lawrence. Allied to *D. Kingianum*. Flowers blush-white.

To *Maxillaria callichroma*, from Sir Trevor Lawrence. Resembling *M. luteoalba*, but with larger flowers.

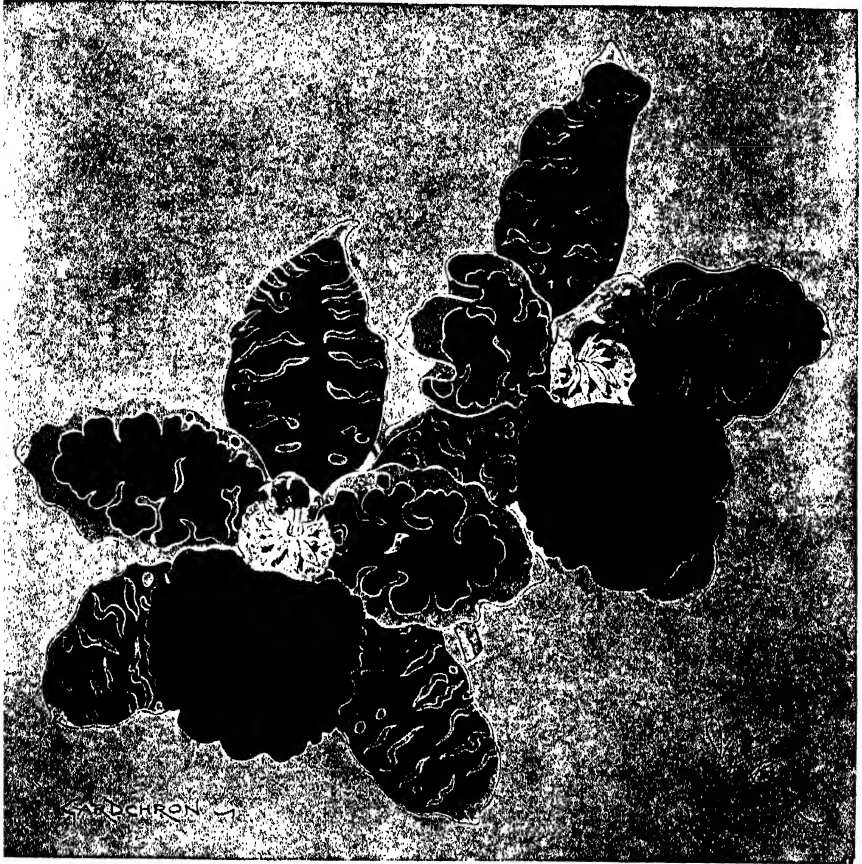


FIG. 84.—*ODONTOGLOSSUM 'JEANETTE.'* (*Gardeners' Chronicle.*) (p. lxiv.)

To *Eria flava*, from Messrs. Mansell & Hatcher. Flowers yellowish, with the scape and backs of the sepals covered with whitish down.

Other Exhibits.

Sir Trevor Lawrence, Bart., K.C.V.O.: rare orchids.

J. Gurney Fowler, Esq.: *Odontiodas*.

Mrs. Norman Cookson: *Odontiodas* and *Dendrobiums*.

H. S. Goodson, Esq.: *Odontiodas*.

H. S. Leon, Esq. : *Cypripediums*.

R. G. Thwaites, Esq. : *Dendrobiums*.

Edward Roberts, Esq. : *Cypripediums*.

Messrs. Hassall : *Cattleyas*.

Mr. E. V. Low : *Cattleyas* and *Cypripediums*.

F. W. Moore, Esq., Glasnevin, Dublin : species of *Pleurothallis*.

ORCHID COMMITTEE, MARCH 14, 1911.

Mr. J. GURNEY FOWLER in the Chair, and twenty-one members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Charlesworth, for a group containing several new hybrids.

Silver Flora Medal.

To Sir Jeremiah Colman, Bart., V.M.H. (gr. Mr. Collier), for *Dendrobiums* and other Orchids.

To Messrs. Sander, for a group.

To Messrs. J. Cypher, for *Cypripediums*, *Dendrobiums*, &c.

To Messrs. Armstrong & Brown, for *Odontoglossums*, *Dendrobiums* and *Cypripediums*.

Silver Banksian Medal.

To Messrs. Stuart Low, for a group.

To Messrs. McBean, for a group.

To Mr. A. W. Jensen, for *Odontoglossums* and *Cattleyas*.

First-class Certificate.

To *Odontoglossum* × 'Jeanette' (*Rossii rubescens* × *amabile heatonense*) (votes, unanimous), from Messrs. Charlesworth. A fine hybrid, following the habit of *O. Rossii*. Sepals and petals closely blotched with reddish-claret colour. Lip with a rounded deep rose front and a yellow base and crest. (Fig. 84.)

Award of Merit.

To *Cymbidium* × *Alexanderi* (*insigne* × *eburneo-Lowianum*) (votes, unanimous), from Lieut.-Colonel Sir George L. Holford K.C.V.O. (gr. Mr. H. G. Alexander). Flowers equal in size and form to those of *C. insigne*; white, flushed with rose, and bearing purple markings on the lip.

To *Cymbidium* × *Gottianum* (*eburneum* × *insigne*) (votes, unanimous), from Messrs. Sander. Flowers several on an erect scape, approaching *C. eburneum*, white, with purple spots and lines on the lip.

Odontoglossum × 'Mirum' *bruggense* (*crispum*, blotched variety × *Wilckeanum*) (votes, unanimous), from Messrs. Sander. Closely approaching a large heavily-blotched *O. crispum*. White with deep purple blotches.

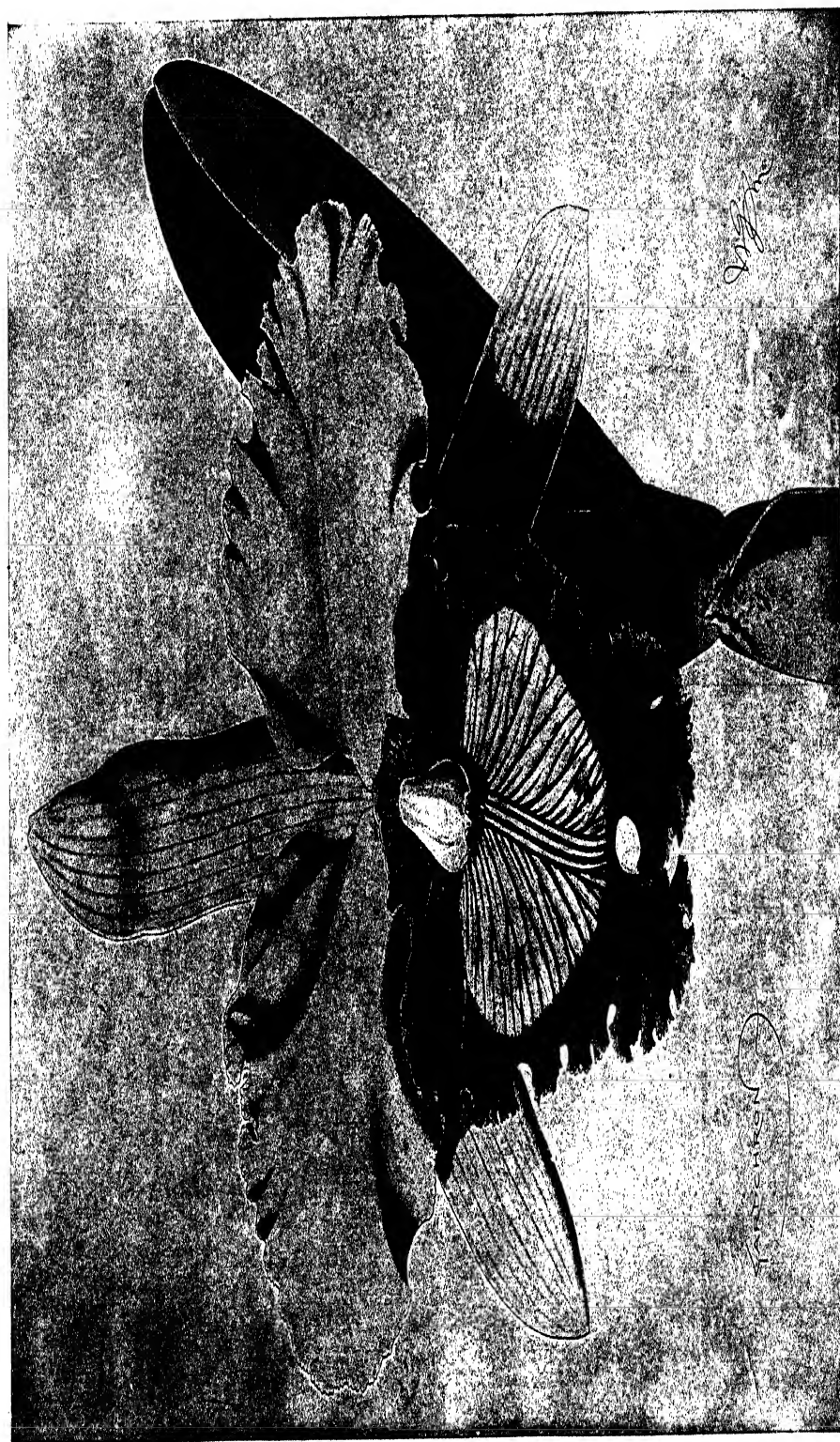


FIG. 85.—BRASSOCATILIA X 'SENATEUR DE BAST.' (*Cardener's Chronicle*.)

To *Laeliocattleya* × *Dominiana*, Monkend variety (*L. purpurata* × *C. Dowiana*) (votes, 14 for, 0 against), from Henry A. Innes, Esq., Croft Spa, Yorks. Flowers rose-purple with deep claret lip.

Other Exhibits.

Hamilton Smith, Esq. (gr. Mr. Coningsby): a group.

de B. Crawshay, Esq. (gr. Mr. Stables): *Odontoglossum* × 'Titania' ('Queen Alexandra' × *crispum* 'Leonard Perfect').

Henry A. Innes, Esq.: rare Orchids.

The Rev. J. Crombleholme: *Cypripedium* × *Johnsonii*.

The Hon. Mrs. Foley: West African orchids.

R. Brooman-White, Esq.: *Odontoglossum crispum* 'Mercedes.'

John S. Moss, Esq.: spikes of hybrid *Odontoglossums*.

Major E. Rogerson: *Odontoglossum* × *eximium* 'Ethel Rogerson.'

ORCHID COMMITTEE, MARCH 28, 1911.

J. GURNEY FOWLER, Esq., in the Chair, and nineteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Charlesworth, for a group of hybrid *Odontoglossums*, &c.

Silver Flora Medal.

To Sir Jeremiah Colman, Bart., V.M.H. (gr. Mr. Collier), for hybrid Orchids.

To Mrs. Norman Cookson (gr. Mr. H. J. Chapman), for hybrid *Odontoglossums* and *Odontiodas*.

To Messrs. Armstrong and Brown, for a group of *Dendrobiums* and *Cypripediums*.

To Messrs. Sander, for a group.

Silver Banksian Medal.

To Samuel Larkin, Esq., Haslemere, for *Vandas*, *Cattleyas*, &c.

To Messrs. Stuart Low, for a group.

To Messrs. Hassall, for a group.

To Mr. E. V. Low, for *Dendrobiums*, *Cypripediums*, &c.

First-class Certificate.

To *Odontioda* × *Vuykstekeae* 'Lady Colman' (*O. Pescatorei* × *C. Noezliana*) (votes, unanimous), from Sir Jeremiah Colman, Bart., V.M.H. (gr. Mr. Collier). Flowers large deep scarlet. (Fig 86.)

Award of Merit.

To *Odontioda* × *ignea* (*Odontoglossum Lindenii* × *Cochlioda Noezliana*) (votes, unanimous), from Monsieur H. Graire, Amiens. Flowers small, like *O. Lindenii*, dark scarlet.

To *Odontoglossum* × *swietenicolor* (*Wilckeanum* × *Vuylstekei*) (votes, unanimous), from Sir Trevor Lawrence, Bart., V.M.H. An attractive hybrid, with the inner parts of the segments dark mahogany-red, the tips and margins cream.

Other Exhibits.

Leopold de Rothschild, Esq.: *Dendrobium Wardianum candidum* with 52 flowers.

William Bolton, Esq.: rare Orchids.

de B. Crawshay, Esq.: *Odontoglossum* × 'Leonides.'

Baron Bruno Schröder: *Odontoglossum* × *Wilckeanum* Schröderianum.



FIG. 86.—ODONTIODA VUYLSTEKEAE 'LADY COLMAN.' (*Gardeners' Chronicle*.) (p. lxv.)

J. Gurney Fowler, Esq.: *Odontiodas*.

H. S. Goodson, Esq.: *Sophrolaeliocattleya* × 'Olive,' Fairlawn variety.

H. S. Leon, Esq.: *Cypripediums*.

ORCHID COMMITTEE, APRIL 11, 1911.

Mr. J. GURNEY FOWLER in the Chair, and twenty-four members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Sander, for a group of Cattleyas, *Odontoglossums*, &c.

To Messrs. Charlesworth, for a group of hybrids.

Silver Flora Medal.

- To Sir Jeremiah Colman, Bart., V.M.H., for a group.
 To Messrs. Mansell and Hatcher, for *Odontoglossums*, &c.
 To Messrs. Stuart Low, for a group.
 To Messrs. W. B. Hartland, for a group.
 To Mr. E. V. Low, for *Cattleyas*, &c.

Silver Banksian Medal.

- To de B. Crawshay, Esq., for hybrid *Odontoglossums*.
 To Samuel Larkin, Esq., for a group.



FIG. 87.—*ODONTOGLOSSUM OSSULSTONII*, THE SHRUBBERY VAR. (*Gardeners' Chronicle*.)

- To Messrs. Armstrong and Brown, for a group.
 To Messrs. McBean, for *Odontoglossums*.

First Class Certificate.

To *Odontoglossum* × *Ossulstonii*, The Shrubbery variety (*crispoharryanum* × *Pescatorei Charlesworthii*) (votes, unanimous), from Messrs. Charlesworth. Flowers creamy-white with the inner two-thirds of the segments claret-purple (Fig. 87).

To *Miltonia* × *Bleuana Peetersiae* (*Bleuana Peetersii* × *Bleuana*) (votes, unanimous), from Monsieur Firmin Lambeau, Brussels. Flowers white, with dark purple blotches on the petals and sepals. Lip with a crimson mask, in front of which is a rosy band (Fig. 88).

Other Exhibits.

Lieut.-Colonel Sir George L. Holford, K.C.V.O. : *Cattleya Schröderae* 'The Baron.'

H. S. Goodson, Esq. : *Odontoglossum crispum* 'Prince Albert.'

R. G. Thwaites, Esq. : *Odontodas* and *Odontoglossums*.

W. Thompson, Esq. : a fine *Odontioda* × *Charlesworthii*.

Monsieur A. A. Peeters : *Miltonia* × *Bleuana* var. 'Jaeken.'

Monsieur Mertens : varieties of *Miltonia vexillaria*.

ORCHID COMMITTEE, APRIL 25, 1911.

Mr. J. GURNEY FOWLER, in the Chair, and twenty members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Sander, for a group, principally hybrids.

To Messrs. Charlesworth, for *Cattleyas*, *Odontoglossums*, and hybrids.

To Messrs. J. Cypher, for a group.

Silver Banksian Medal.

To Samuel Larkin, Esq., Haslemere (gr. Mr. Hales), for *Phalaenopsis*, *Cattleyas*, &c.

To G. W. Bird, Esq., West Wickham (gr. Mr. Redden), for fine hybrid Orchids.

To Messrs. Stuart Low, for a group.

Award of Merit.

To *Odontoglossum* × *ramos-Edwardii* (votes, 14 for, 3 against), from Sir Trevor Lawrence, Bart., K.C.V.O. (gr. Mr. W. H. White). A pretty hybrid, nearest to *O. ramosissimum*. Inflorescence branched; flowers two inches across, blush white spotted with purple on the inner parts of the segments.

To *Diacattleya* × *Sanderæ* (*Diacrium bicornutum* × *Cattleya Mendelii*) (votes, unanimous), from Messrs. Sander, St. Albans. Growth of *Diacrium bicornutum*, but pseudo-bulbs slightly compressed. Inflorescence three-flowered. Flowers four inches across; segments broad; white with slight rose marking, and pale yellow tinge on the lip.

Cultural Commendation.

To Messrs. Sander, for a large specimen of *Maxillaria Sanderiana*, with about fifty flowers.

To Lieut.-Colonel H. Powys Greenwood, Salisbury, for a large specimen of *Cymbidium eburneum*.



FIG. 88.—MITONIA BREVINA PETERSIAE. (*Gardener's Chronicle*.)

Other Exhibits.

- Baron Bruno Schröder: *Brasso-cattleya* × 'Queen of Spain.'
Sir Trevor Lawrence, Bart., K.C.V.O.: *Brasso-cattleyas*.
H. S. Goodson, Esq.: *Odontoglossum* × *percultum* var.
Monsieur H. Graire: *Odontoglossum* × *Rossianae* var.
J. Gurney Fowler, Esq.: *Brassocattlaelia* × *Fowleri*.
de B. Crawshay, Esq.: *Odontoglossums* and *Odontiodas*.
R. G. Thwaites, Esq.: hybrid orchids.
Messrs. Duchesne and Lanthoine: *Miltonia vexillaria* 'Memoria G.
D. Owen.'
Mr. E. V. Low: a group.
Messrs Hassall: a group.
Messrs. McBean: *Odontoglossums*.

ESTABLISHED
1804.



INCORPORATED
1809.

TELEGRAMS:
"HORTENSIA, LONDON."

TELEPHONE:
5363 WESTMINSTER

ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W.

NOTICES TO FELLOWS.

- | | |
|--|--|
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| 2. Letters. | 23. Shows of Kindred Societies in 1911. |
| 3. Telephone and Telegrams. | 24. Show of Forced Spring Bulbs. |
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| 10. An Appeal. | 31. Spraying of Fruit Trees. |
| 11. Lindley Library. | 32. Varieties of Fruits. |
| 12. The Society's Gardens at Wisley. | 33. Plants Certificated. |
| 13. Rock Garden at Wisley. | 34. International Horticultural Exhibition, May 22-30, 1912. |
| 14. New Bothy at Wisley. | 35. Spring Bulb Show, March 5 & 6, 1912. |
| 15. Trials at Wisley in 1911-12. | 36. Recognition of Diligent Interest in Plants. |
| 16. The Wisley Research Station. | 37. MS. for Journal. |
| 17. Students at Wisley. | 38. Advertisements. |
| 18. Distribution of Surplus Plants. | |
| 19. Exhibitions, Meetings, and Lectures in 1911. | |
| 20. Dates fixed for 1911. | |
| 21. British Fruit and Vegetables. | |

1. GENERAL.

Notices to Fellows are always added at the end of each number of the JOURNAL, immediately preceding the Advertisements, and also at the beginning both of the "Book of Arrangements" and of the "Report of the Council." Fellows are particularly requested to consult these Notices, as it would often save them and the Secretary much needless correspondence.

2. LETTERS.

All letters on all subjects should be addressed—The Secretary, Royal Horticultural Hall, Vincent Square, Westminster, S.W.

3. TELEPHONE AND TELEGRAMS.

Telephone Number : **5363 WESTMINSTER.**

" HORTENSIA, LONDON," is sufficient address for telegrams.

4. JOURNALS WANTED.

The Secretary would be greatly obliged by the return to the Society of ANY NUMBERS of the JOURNAL which may be of no further use to Fellows. Complete sets are occasionally applied for, but, at the present moment, not even one can be supplied owing to the stock of the following being exhausted :—

VOLUME V. Part 1.

VOLUME XIII. Part 1.

VOLUME X.

VOLUME XIV.

These are therefore particularly asked for.

5. SUBSCRIPTIONS.

All Subscriptions fall due on January 1st of each year. To avoid the inconvenience of remembering this, Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments ; or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1st. It may be a week or more before the Tickets reach the Fellows, owing to the very large number, over 20,000, to be despatched within the first month of the year. Fellows who have not already given an order on their bankers for the payment of their subscriptions each year are requested to do so, as this method of payment is preferred, and saves the Fellows considerable trouble. Fellows whose subscriptions remain unpaid are debarred from all the privileges of the Society ; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

In paying their subscriptions, Fellows often make the mistake of drawing their cheques for Pounds instead of for Guineas. Kindly note that in all cases it is Guineas, and not Pounds. Cheques and Postal Orders should be made payable to "The Royal Horticultural Society" and crossed "London County and Westminster Bank, Victoria Branch, S.W."

6. FORM OF BEQUEST.

I give and bequeath to the Treasurer for the time being of the Royal Horticultural Society, London, the sum of £....., to be paid out of such part of my personal estate as I can lawfully charge with the payment of such legacy, and to be paid free of legacy duty, within six months of my decease ; the receipt of such Treasurer to be a sufficient discharge for the same. And I declare that the said legacy shall be applied towards [the general purposes of the Society].*

7. PRIVILEGES OF CHEMICAL ANALYSIS.

Instructions are contained at page 80 in the "Book of Arrangements," 1911.

* Any special directions or conditions which the testator may wish to be attached to the bequest may be substituted for the words in brackets.

8. LIST OF FELLOWS.

A list of all the Fellows of the Society is sent out in January. Fellows are requested to look at their own names in it, and if in any way these are incorrect, or the address insufficient, they are requested to inform the Secretary at once. Forms of Nomination, and of the Privileges of Fellows, are bound in with every number of the JOURNAL (Advt. pp. 83, 86) and the "Book of Arrangements."

9. NEW FELLOWS.

The President and Council fully appreciate how much the prosperity of the Society and its present large number of Fellows are due to the efforts of Fellows to enlist the sympathy of their friends; and the steady advance during recent years indicates the increasing recognition of the Society's work and usefulness. But it must not be supposed that a maximum has yet been reached. There is ample room for a great increase of Fellows, especially in America and the Colonies.

10. AN APPEAL.

What has been accomplished for the Society since 1887 is largely due to the unwearied assistance afforded by a small proportion of the Fellows; but as all belong to the same Society, so it behoves each one to do what he or she can to further its interests, especially by:—

1. Increasing the number of Fellows.
2. Helping to swell the General Prize Fund started by Mr. A. W. Sutton, V.M.H., for providing Prizes for the Students at Wisley.
3. Providing lectures with lantern slides.
4. Presenting books to fill the gaps in the Library both at Vincent Square and at Wisley.
5. Sending new and rare Plants and Seeds for the Garden and surplus Roots for distribution to the Fellows.
6. Sending Plants for the *New Rock Garden* at Wisley.

Thus there is plenty for all to do according to their individual liking: personal effort, money, plants, books, are all alike needed. The Secretary, therefore, asks those who read these lines to do their best to help in any of the ways above indicated.

Since this notice last appeared, the following gifts have been received:—Two large water-colour drawings of orchids from Sir Trevor Lawrence, Bart., K.C.V.O.; 150 volumes from the late Colonel Beddome's library, presented by Mrs. Beddome; a collection of dried specimens of British plants from Miss F. M. Hudson, for the Wisley School; and a fine old steel engraving of Linnaeus from Mr. Christopher P. Sandberg.

11. LINDLEY LIBRARY.

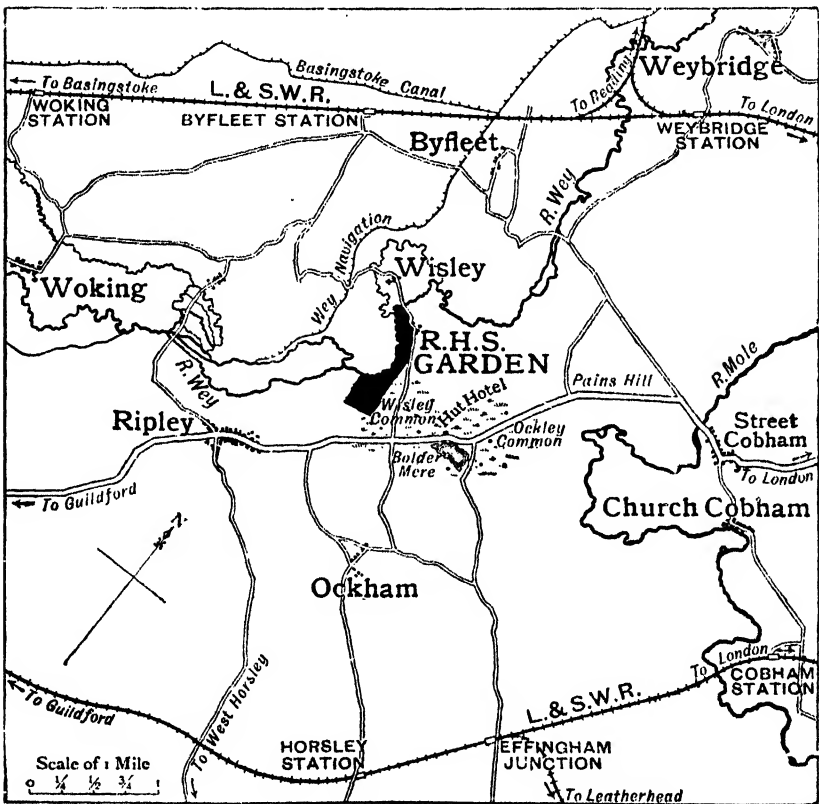
The Society acting in and through its Council, having now become sole trustee of the Lindley Library, Fellows and friends of the R.H.S. have the encouragement of knowing that their gifts to the Library can

never be lost to the Society, but are attached to it in perpetuity. It should now be the aim of all to make the Library far more perfect and complete than it is at present. Gifts of books, old or new, will be gratefully accepted.

12. THE SOCIETY'S GARDENS AT WISLEY.

The Gardens are open daily to Fellows and others showing Fellows' Transferable Tickets, from 9 A.M. till sunset, except on Sundays, Good Friday, Christmas Day, and Exhibition Days. Each Fellow's Ticket admits three to the Gardens. The Public are not admitted.

The Gardens, situated at Wisley (about 2 miles from Ripley, in Surrey), are about 3 miles from Byfleet, $3\frac{1}{2}$ miles from Horsley, and $5\frac{1}{2}$ miles from Weybridge, all stations on the South-Western Railway, with frequent trains from Waterloo and Clapham Junction. Carriages to convey four persons can be obtained by writing to Mr. D. White,



POSITION OF THE SOCIETY'S GARDENS.

fly proprietor, Ripley, Surrey; the charge being, to and from Weybridge, waiting two hours at the Gardens, 8s.; or waiting three hours, 10s.; or to and from Horsley, 7s.; Effingham Junction, 7s.; Byfleet, 7s. Visitors should in all cases be careful to state the trains they intend to arrive by and leave by. Carriages can also be obtained at Weybridge

for 8s. by writing to Mr. Trembling, New Road, Weybridge. Excellent accommodation and refreshments can be had at the Hut Hotel, close to the Gardens, and also at the Hautboy at Ockham.

The motor route from London to Wisley will be found in the "Book of Arrangements," p. 118.

13. ROCK GARDEN AT WISLEY.

In consequence of the rapidly increasing interest taken in what are popularly called "Alpine Plants," "Alpines," or "Rock Plants," the Council have decided to construct a Rock Garden at Wisley on a somewhat extensive scale. The idea is to obtain the best possible positions and soils for the different plants to grow in, the growth and well-being of the plants being considered to be of even greater importance than the artistic effect of the rockwork. In a Horticultural Society's Garden every single detail should teach something, so that Fellows visiting it may be able to take away an idea of how best to do this or that or where best to plant this or that. The construction of the Rock Garden is nearing completion, but it will be two, or possibly three, years or more before the plants on it can be seen at their best.

14. NEW BOTHY AT WISLEY.

The Council has always been anxious to promote the welfare of their gardeners, and with this object in view they have recently completed a new bothy, which they hope may prove of use far and wide as establishing the desirable *via media* between extravagance on the one hand and disregard of the men's comfort on the other. It may well serve as a model for the construction of bothies elsewhere.

15. TRIALS AT WISLEY IN 1911-12.

Trials of Fruits, Flowers, and Vegetables at the Wisley Gardens during 1911-12 have been arranged as follows:—

[N.B.—Everything sent for trial *must be named*, and the name and address of the sender attached.]

Fruit.—Strawberries and raspberries, autumn fruiting. These trials will be continued.

Flowers.—Fuchsias for bedding and for the conservatory. Two plants of each to be sent in early March.

Begonias (fibrous), including summer and winter flowering and bedding varieties. Two plants of each to be sent in March.

Delphiniums. Two plants of each in February.

Dahlias (decorative), introduced into commerce since January 1, 1908. Two plants of each in May.

Primulas (hardy) for borders and rock work. Three plants of each in February.

Vegetables.—Carrots. $\frac{1}{2}$ oz. of each early in February.

Cucumbers. 6 seeds of each in February.

Peas. 1 pint of each early in February.*

* *Trial of Peas*.—It has been pointed out that it is not fair to compare and to adjudicate on the merits of varieties of Peas sown on different dates; but that all peas sent for trial ought to be sown on one and the same day. The Council felt

Cabbages, Savoy. 1 packet of seed of each in March.

Potatos, 'mid-season' and 'late.' Each variety must be labelled as being 'mid-season' or 'late.' 20 tubers of each to be sent by February

If sent by post: The Superintendent, R.H.S. Gardens, Wisley, Ripley, Surrey.

If sent by rail: The Superintendent, R.H.S. Gardens, Wisley, Horsley Station, L. & S.-W. R., with advice by post to the Superintendent.

16. THE WISLEY RESEARCH STATION.

Investigations are now in full swing at the new Research Station and Laboratory at Wisley. All communications relating to them should be addressed to Mr. F. J. Chittenden, F.L.S., Director of the Research Work on Scientific Matters affecting Practical Horticulture, and Lecturer to the Students.

17. STUDENTS AT WISLEY.

N.B. There will be a few vacancies for the two years' Course commencing on March 12, 1912. Early application should be made to the Secretary.

The Society admits young men, between the ages of 16 and 22 years, to study Gardening at Wisley. The curriculum includes not only practical garden work in all the main branches of Horticulture, but also lectures, demonstrations, and Elementary Horticultural Science in the Laboratory, whereby a practical knowledge of simple Garden Chemistry, Biology, &c., may be obtained. The Laboratory is equipped with the best apparatus procurable for Students. The training extends over a period of two years, with a progressive course for each year. Students can enter only at the end of September or at the end of March. Selected Students have the advantage of attending certain of the Society's Shows and Lectures in London.

18. DISTRIBUTION OF SURPLUS PLANTS.

In a recent Report the Council drew attention to the way in which the annual distribution of surplus plants has arisen. In a large garden there must always be a great deal of surplus stock, which must either be given away or go to the waste heap. A few Fellows, noticing this, asked for plants which would otherwise be discarded; and they valued what was so obtained. Others hearing of it asked for a share, until the Council felt they must either systematize this haphazard distribution or else put a stop to it altogether. To take the latter step seemed undesirable. Why should not such Fellows have them as cared to receive such surplus plants? It was therefore decided to keep all plants till the early spring, and then give all Fellows alike the option of claiming a share of them by Ballot.

however, that it would not be quite fair on an admittedly late pea to sow it on the same day as an admittedly early one. It has therefore been decided to ask for one pint of seed peas and divide it into three parts, and make sowings of all varieties on three different dates suiting Early, Mid-season, and Late peas, as in this way only can the two difficulties be overcome.

Fellows are therefore particularly requested to notice that only waste and surplus plants raised from seeds or cuttings are available for distribution. Many of them may be of very little intrinsic value, and it is only to avoid their being absolutely wasted that the distribution is permitted. The great majority also are of necessity *very small*, and may require careful treatment for a time.

Fellows are particularly requested to note that a Form of Application and list to choose from of the plants available for distribution is sent in January *every year* to every Fellow, enclosed in the "Report of the Council." To avoid all possibility of favour, all application lists are kept until the last day of February, when they are all thrown into a Ballot; and as the lists are drawn out, so is the order of their execution, the plants being despatched as quickly as possible after March 1.

Of some of the varieties enumerated the stock is small, perhaps not more than twenty-five or fifty plants being available. It is therefore obvious that when the Ballot is kind to any Fellow he will receive the majority of the plants he has selected, but when the Ballot has given him an unfavourable place he may find the stock of almost all the plants he has chosen exhausted. A little consideration would show that all Fellows cannot be first, and some must be last, in the Ballot. Application forms received after March 1 and before April 30 are kept till all those previously received have been dealt with, and are then balloted in a similar way. Fellows having omitted to fill up their application form before April 30 must be content to wait till the next year's distribution. The work of the Gardens cannot be disorganized by the sending out of plants at any later time in the year. All Fellows can participate in the annual distribution *following* their election.

The Society does not pay the cost of packing and carriage. The charge for this will be collected by the carriers on delivery of the plants, which will be addressed exactly as given by each Fellow on his application form. It is impracticable to send plants by post, owing to the lack of Post Office facilities for despatch without prepayment of postage.

Fellows residing beyond a radius of thirty-five miles from London are permitted to choose double the number of plants to which they are otherwise entitled.

Plants cannot be sent to Fellows residing outside the United Kingdom, owing either to length of time in transit or to vexatious regulations in some foreign countries; but the Council will at any time endeavour to obtain for Fellows living abroad any unusual or rare seeds which they may have been unable to procure in their own country.

No plants will be sent to Fellows whose subscription is in arrear, or who do not fill up their form properly.

19. EXHIBITIONS, MEETINGS, AND LECTURES IN 1911.

The programme will be found in the "Book of Arrangements" for 1911. An Exhibition and Meeting is held practically every fortnight throughout the year, and a short lecture on some subject connected with Horticulture is delivered during the afternoon.

A reminder of every Show will be sent in the week preceding to any

Fellow who will send to the R.H.S. Offices, Vincent Square, S.W., a sufficient number (29) of halfpenny cards *ready addressed* to himself.

20. DATES FIXED FOR 1911.

Jan. 8, 17, 81	July 4, 5, & 6 (Olympia), 11 & 12
Feb. 14, 28	(Sweet Peas), 18, 25 (Carnations)
March 14 and 15 (Bulbs), 28	August 1, 29, 30 (Vegetables)
April 11, 25 (Auriculas)	Sept. 12, 14 (Autumn Roses), 26
May 9, 23 to 25 (Temple Show)	(Vegetable Show)
May 30 to June 2 (Rhododendron Show)	Oct. 10, 11 (Fruit Show), 24
June 6, 20	Nov. 7, 21
	Dec. 5

21. BRITISH FRUIT AND VEGETABLES.

In 1911, the Great Fruit Show will be held on October 10 and 11 and the Vegetable Show will be combined with the Ordinary Meeting on September 26. The Schedules of the Prizes are now ready.

22. CHALLENGE CUPS FOR VEGETABLES.

A handsome Silver-gilt Challenge Cup has been presented to the Society by Messrs. Sutton, of Reading, and the Council will again offer it, with £10, for vegetables on September 26, 1911. The Society also offers a Champion Challenge Cup for the greatest number of points obtained by any one exhibitor throughout the same Exhibition, the winner of the Sutton Cup being excluded. These Cups may be won by the same exhibitor only once in three years, but he may compete every year for any second prize that may be offered.

23. SHOWS OF KINDRED SOCIETIES IN 1911.

The following dates have been fixed, on which R.H.S. Fellows' Tickets will admit :—

April 25.—Auricula Society.	July 25.—Carnation Society.
May 24.—Tulip Society.	August 30.—Vegetable Society.
July 11–12.—Sweet Pea Society.	September 14.—Rose Society.

For Schedules of these Shows see under above dates in the "Book of Arrangements," 1911.

24. SHOW OF FORCED SPRING BULBS.

A Special Exhibition of Forced Spring Bulbs will be held on March 5 and 6, 1912. The object of this Show is to demonstrate the varieties best suited for gentle forcing, and exhibits of small and large collections are invited from Amateurs and the Trade. R.H.S. Medals will be awarded according to merit.

The Council also offer (subject to the General Rules of the Society) the following Prizes presented to them by the General Bulb Growers' Society of Haarlem :—

Division I.—For Amateurs.

Class 3.—Eighteen Hyacinths, distinct.

1st Prize . . .	£6 6s.	4th Prize . . .	£3 8s.
2nd „ . . .	£5 5s.	5th „ . . .	£2 2s.
3rd „ . . .	£4 4s.	6th „ . . .	£1 1s.

Class 4.—Twelve Hyacinths, distinct.

1st Prize . . .	£5 5s.	4th Prize . . .	£2 2s.
2nd „ . . .	£4 4s.	5th „ . . .	£1 1s.
3rd „ . . .	£3 8s.		

Class 5.—Six Hyacinths, distinct.

1st Prize . . .	£2 2s.	3rd Prize . . .	£1 1s.
2nd „ . . .	£1 10s.	4th „ . . .	10s.

Class 6.—Four pans containing Hyacinths, ten roots of one variety in each pan. The blooms of each pan to be of distinctly different colour from those of the other three pans. The bulbs need not have been actually grown in the pans they are shown in.

1st Prize . . .	£4 4s.	3rd Prize . . .	£2 2s.
2nd „ . . .	£3 8s.	4th „ . . .	£1 1s.

Division II.—For Trade Growers.

Class 7.—Collection of 100 Hyacinths in twenty named varieties, five blooms of each variety grown in pots or glasses.

Prize—The Gold Medal of the General Bulb Growers' Society of Haarlem.

Class 8.—Collection of 120 Hyacinths in twelve varieties in pans, ten roots of one variety in each pan. The bulbs need not have been actually grown in the pans they are shown in.

Prize—The Gold Medal of the General Bulb Growers' Society of Haarlem.

Regulations.—For Classes 3, 4, and 5 each bulb must be in a separate pot (size optional). Classes 3, 4, 5, and 6 must all be single spikes; no spikes may be tied together. Exhibitors may compete in one only of the classes numbered 3, 4, and 5. All bulbs must have been forced entirely in Great Britain or Ireland. All varieties should be correctly named. Points will be deducted for all incorrect names.

25. EXAMINATIONS, 1912.

1. The Annual Examination in the Principles and Practice of Horticulture will be held on March 27, 1912. The Examination has two divisions, viz. (a) for Candidates of eighteen years of age and over, and (b) for Juniors under eighteen years. Particulars for 1912 may be obtained by sending a stamped and directed envelope to the Society's Offices. Copies of the Questions set from 1898 to 1910 (price 2s. post free) may also be obtained from the Office. The Society is willing to hold an Examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to examinations will consent to supervise one on the Society's behalf.

The Examination will not be held outside the British Isles until further notice.

In connexion with this Examination a Scholarship of £25 a year for two years is offered by the Worshipful Company of Gardeners, to be awarded after the 1912 Examination to the student who shall pass highest, if he is willing to accept the conditions attaching thereto. The main outline of these conditions is that the holder must be of the male sex, and between the ages of 18 and 22 years, and that he should study gardening for one year at least at the Society's Gardens at Wisley, conforming to the general rules laid down there for Students. In the second year of the Scholarship he may, if he like, continue his studies at some other place at home or abroad which is approved by the Council of the Society. In case of two or more eligible Students being adjudged equal, the Council reserve to themselves the right to decide which of them shall be presented to the Scholarship.

2. The Society will also hold an Examination in Cottage Gardening on April 17, 1912. This Examination is intended for, and is confined to, Elementary and Technical School Teachers. It is undertaken in view of the increasing demand in country districts that the Schoolmaster shall be competent to teach the elements of Cottage Gardening, and the absence of any test of such competence. The general conduct of this Examination is on similar lines to that of the more general Examination. Questions on Elementary Chemistry and Biology are included in this Examination.

3. The Society will hold an Examination in the Royal Horticultural Hall, Vincent Square, S.W., on Monday, January 8, 1912, for gardeners employed in Public Parks and Gardens belonging to County Councils, City Corporations, and similar bodies. Entries close on January 1, 1912.

Medals and Certificates are awarded and Class Lists published in connexion with these Examinations. The Syllabus may be obtained on application to the Secretary, R.H.S., Vincent Square.

26. INFORMATION.

Fellows may obtain information and advice from the Society as to the names of flowers and fruit, on points of practice, insect and fungoid attacks, and other questions by applying to the Secretary, R.H.S., Vincent Square, Westminster, S.W. Where at all practicable it is particularly requested that letters and specimens may be timed to reach Vincent Square by the first post on the mornings of the Fortnightly Meetings, so as to be laid before the Scientific or other Committees at once.

27. INSPECTION OF FELLOWS' GARDENS.

The Inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and advises at the following cost, viz. a fee of £3 8s. for one day (or £5 5s. for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the

most convenient railway station and its distance from their gardens. Gardens can only be inspected at the *written* request of the *owner*.

28. AFFILIATION OF LOCAL SOCIETIES.

One of the most successful of the many new branches of work undertaken since the reconstruction of the Society in 1887 is the unification of local Horticultural Societies by a scheme of affiliation to the R.H.S. Since this was initiated no fewer than 300 Societies have joined our ranks, and the number is steadily increasing.

The Parent Society offers annually a Silver Challenge Cup to be competed for by Affiliated Societies. (For alteration of conditions, see "Book of Schedules," under date October 10 and 11.)

To the privileges of Affiliated Societies have been added all the benefits accruing under the scheme recently introduced for the Union of Horticultural Mutual Improvement Societies.

Secretaries of Affiliated Societies can obtain on application a specimen of a Card which the Council have prepared for the use of Affiliated Societies for Certificates, Commendations, &c. Price 8s. 6d. for 10 copies, 5s. 6d. for 20, 11s. 6d. for 50, 20s. for 100.

The Council have also struck a special Medal for the use of Affiliated Societies. It is issued at cost price in Bronze, Silver, and Silver-gilt—viz. Bronze, 5s. 6d., with case complete; Silver, 12s. 6d., with case complete; Silver-gilt, 16s. 6d., with case complete. Award Cards having the Medal embossed in relief can be sent with the Medal if ordered, price 6d. each.

29. UNION OF HORTICULTURAL MUTUAL IMPROVEMENT SOCIETIES.

This Union has been established for the encouragement and assistance of Horticultural Mutual Improvement Societies, the object being to strengthen existing Societies, to promote interchange of lecturers, to provide printed lectures, and if possible to increase the number of these useful Societies.

A new and revised list of lecturers and their subjects, and a list of typewritten lectures, with or without lantern slides, prepared by the Society, may be obtained from the Secretary, R.H.S., price 8d.

Lantern slides on horticultural topics are much needed, and their gift will be very much appreciated.

30. ALTERATIONS IN RULES FOR JUDGING—1911 CODE.

The "Rules for Judging, with Suggestions to Schedule Makers and Exhibitors," have been revised, and the new edition is now ready. Special attention is drawn to the amended Rule defining "an amateur," with suggestions for establishing four distinct classes of amateurs to meet the requirements of larger or smaller local Societies. (See also p. 86,

"Book of Arrangements.") The "pointing" recommended for fruits and vegetables has also been considerably amended, and the terms "annuals" and "biennials" further explained. The secretaries of local Societies are advised to obtain a fresh copy. It will be sent post free on receipt of a postal order for 1s. 6d., addressed to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W.

Exhibitors of vegetables are specially warned that the numbers of specimens to a dish appearing on p. 19 of the 1909 Code of Rules have been still further modified.

31. SPRAYING OF FRUIT TREES.

The Report of the Conference on the Spraying of Fruit Trees, held in the R.H.S. Hall on October 16, 1908, may still be obtained at the Society's Offices, Vincent Square, Westminster, price 1s. The book deals with the methods of spraying fruit trees for both insect and fungus pests, with information as to washes and spraying machinery, and forms the latest collated information on this subject.

32. VARIETIES OF FRUITS.

Many people plant Fruit trees without a thought of what Variety they shall plant, and as a result almost certain disappointment ensues, whilst for an expenditure of 2d. they can obtain from the Society a little 16-page pamphlet which contains the latest expert opinion on Apples, Pears, Plums, Cherries, Raspberries, Currants, Gooseberries, and Strawberries, together with Notes on Planting, Pruning, and Manuring, which for clearness of expression and direction it would be impossible to surpass. It has in fact been suggested that no other 16 pages in the English language contain so much and such definite information. At the end of the pamphlet are given the names of some of the newer varieties of Fruits, which promise well, but are not yet sufficiently proved to be recommended for general planting.

Copies of this pamphlet for distribution may be obtained at the Society's Office, Vincent Square, Westminster. Price, post free: single copy, 2d., or 2s. ; 50, 3s. ; 100, 4s.

33. PLANTS CERTIFICATED.

The last-published list of "Plants Certificated by the Society" commenced with the year 1859 and closed with 1899. A further 11 years have now passed and the Council have republished the list up to the end of 1910, constituting a record of all the plants which have received awards during the past 50 years. The completed list will be of great assistance to amateurs and an absolute necessity to raisers and introducers of new plants. It is now ready, price 2s. post free, not including Orchids.

ORCHIDS CERTIFICATED.

The list of awards made to Orchids, with parentage, &c., has recently been published separately, and may be obtained at the Society's Office,

Vincent Square, Westminster, bound in cloth and interleaved, price 5s. net.

34. INTERNATIONAL HORTICULTURAL EXHIBITION, MAY 22-30, 1912.

Most of the Fellows of the Society will have already heard that an Association has been formed to organize an International Flower Show in London in the spring of 1912, as the outcome of a suggestion made by the Secretary of the Society that such a courtesy on the part of Great Britain was due (or indeed overdue) to the Continent and to America for the many similar hospitalities which foreign countries have offered to British horticulturists.

The Executive Committee now consists of prominent people of various professions and callings (including several leading gardeners), in whom every confidence may be placed to bring the proposal to a satisfactory conclusion on points of organization, exhibits, and finance. A large number of noblemen and gentlemen have lent their names to the scheme, together with many men of position and renown in science.

It must be fully understood and constantly borne in mind that the Royal Horticultural Society is not organizing the Exhibition, and that for many excellent reasons. Fellows are, therefore, asked from the very beginning to recognize the Exhibition as being absolutely distinct from the Society, being, in fact, an entirely separate and independent organization. The Society has, however, most warmly welcomed the proposal that such an International Exhibition should be held, and it will render the Association every assistance in its power.

The Association, recognizing the importance of securing the great weight of horticultural interest vested in the Society, have approached the Council with a view to establishing a suitable friendly working arrangement between the two bodies. Negotiations have accordingly been actively proceeding, whereby it has been decided that—

(a) The Royal Horticultural Society agrees—

1. To forgo in 1912 its great Spring Show hitherto held, by kind permission of the Master and Benchers, in the gardens of the Inner Temple;
2. To contribute £1,000 towards the expenses of promoting the International Exhibition; and
3. To guarantee a further sum of £4,000 against the hardly probable contingency of there being an ultimate loss on the Exhibition.

(b) The Executive Committee of the International Exhibition, 1912, agrees—

1. To give to all Fellows of the Society certain special and definite privileges over the general public in regard to the purchase of tickets for the Exhibition; and
2. To allow all such tickets purchased by Fellows of the Society to be transferable.

INTERNATIONAL EXHIBITION, 1912, AND THE ROYAL HORTICULTURAL
SOCIETY.

Subscribers and Guarantors to the International Exhibition, 1912, who happen to be Fellows of the Royal Horticultural Society, are requested to understand clearly that the privileges they become entitled to in return for their contribution to the International have nothing whatever to do with the R.H.S. With reference to such privileges they must correspond only with the International.

On the other hand, the privileges to which Fellows of the Society are entitled as a result of the arrangement made by the Council of the R.H.S. with the Executive of the International—the distribution of these privileges will be made entirely by the officers of the R.H.S., the officers of the International having nothing whatever to do with the carrying out of the arrangement.

Consequently,

1. For all matters relating to, or connected with, Subscription or Guarantee to the International Exhibition, address, Ed. White, Esq., Hon. Sec., International Exhibition, 7, Victoria Street, Westminster; and

2. For all matters relating to privileges pertaining to anyone as a Fellow of the Royal Horticultural Society, address Secretary, R.H.S., Vincent Square, S.W.

It will further be seen from this, that

8. If a Fellow of the R.H.S. subscribes, say, £10 10s. to the International, obtaining thereby the privilege of tickets for the International to the value of £12 12s., the number of tickets to be issued by the International in respect of that £12 12s. cannot be computed on the basis of the arrangement made with the R.H.S., but must be calculated simply on their face value, and will be sent direct from the International Offices, 7 Victoria Street, Westminster.

ED. WHITE,

Hon. Director International, 1912.

W. WILKS,

Secretary, R.H.S.

35. SPRING BULB SHOW, MARCH 5 & 6, 1912.

See also page lxxvii.

Subject to the general rules of the Society the Council offer the following prizes, presented to them by Mr. Robert Sydenham.

Classes 9-11.—Bulbs grown in Moss Fibre or similar material (not earth) and without drainage.

AMATEURS.

Class 9.—Six single Hyacinths, in separate vases, not exceeding six inches in diameter, to be selected from any one of the following varieties :

'Enchantress,' 'General de Wet,' 'Innocence,' 'Jacques,' 'Johan,' 'King Alfred,' 'King of the Blues,' 'Koh-i-Noor,' 'Lady Derby,' 'Ornament Rose,' 'Princess May,' 'Roi des Belges,' 'Rose à Merveille,' 'Schotel.'

Prizes, 21s., 17s. 6d., 15s., 10s. 6d., 7s. 6d.

Class 10.—Six vases of Tulips (vases not exceeding seven inches in diameter), no restriction as to the number of bulbs in a vase, to be selected from the following: 'Duchesse de Parma,' 'Fabiola,' 'Joost van den Vondel,' 'Keizerskroon,' 'La Rêve,' 'Mon Tresor,' 'Prince of Austria,' 'Queen of the Netherlands,' 'Rose Luisante,' 'Van der Neer,' 'Vermilion den Brilliant,' 'White Joost van Vondel.'

Prizes, 21s., 17s. 6d., 15s., 10s. 6d., 7s. 6d.

Class 11.—Six vases of Narcissi (vases not exceeding seven inches in diameter), no restriction as to the number of bulbs in a vase, to be selected from the following: 'Albatross,' 'Blood Orange,' 'Bullfinch,' 'C. J. Backhouse,' 'Dairymaid,' 'Early Easter,' 'Emperor,' 'Glitter,' 'Horace,' 'Leonie,' 'Lilian,' 'Lucifer,' 'Lulworth,' 'Madame de Graaff,' 'Red Coat,' 'Red Flag,' 'Shooting Star,' 'Victoria,' 'White Lady.'

Prizes, 21s., 17s. 6d., 15s., 10s. 6d., 7s. 6d.

If there are more than six exhibits in either of the classes an extra prize of 7s. 6d. will be given in such class if there are eight exhibits; a further 7s. 6d. if there are ten exhibits, and so on in the proportion of one prize for every two exhibits exceeding six in each class.

36. RECOGNITION OF DILIGENT INTEREST IN PLANTS.

The Council have founded a card of "Recognition of Diligent Interest in Plants." Issued in response to frequent applications by school authorities for some token of encouragement of work with plants amongst scholars, it is to be awarded to the boy or girl (or both) who, in the yearly school competitions in plant cultivation, or garden plot keeping, or Nature study, has secured the first prize. The cards are 12 inches by 8 inches, and may be had on application to the Secretary, R.H.S., Vincent Square, London, S.W. (price 6d. each), and signed by the head master or mistress and a member of the education authority concerned. The application should contain information as to (a) the nature of the competition, (b) the number of competitors, (c) the judges, (d) the number of prizes awarded in the competition, (e) the full name of the first prize winner. The Council of the R.H.S. will at their own absolute discretion grant or withhold this "recognition."

37. MS. FOR JOURNAL.

The Editor is always glad to receive suitable articles for issue in the JOURNAL from corresponding and other Fellows of the Society. It is

thought that much more might be done in this direction to disseminate valuable botanical and horticultural information, and to publish records of work and research conducted by other than actual official members of the Society. The JOURNAL is received by the best libraries in the world, and is regularly sent to all the 12,000 Fellows of the Society.

38. ADVERTISEMENTS.

Fellows are reminded that the more they can place their orders with those who advertise in the Society's Publications the more likely others are to advertise also, and in this way the Society may be indirectly benefited.

FELLOWS' PRIVILEGES OF CHEMICAL ANALYSIS.

(Applicable only to the case of those Fellows who are not engaged in any Horticultural Trade, or in the manufacture or sale of any substance sent for Analysis.)

THE Council have fixed the following rates of charges for Chemical Analysis to Fellows of the Society being *bona fide* Gardeners or Amateurs.

These privileges are applicable only when the Analyses are for *bona fide* horticultural purposes, and are required by Fellows for their own use and guidance in respect of gardens or orchards in their own occupation.

The analyses are given on the understanding that they are required for the individual and sole benefit of the Fellow applying for them, and must not be used for the information of other persons, or for commercial purposes.

Gardeners, when forwarding samples, are required to state the name of the Fellow on whose behalf they apply.

The analyses and reports may not be communicated to either vendor or manufacturer, except in cases of dispute.

When applying for an analysis, Fellows must be very particular to quote the number in the following schedule under which they wish it to be made.

No.

1. An opinion on the purity of bone-dust (each sample)	2s. 6d.
2. An analysis of sulphate or muriate of ammonia, or of nitrate of soda, together with an opinion as to whether it be worth the price charged	5s.
3. An analysis of guano, showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts and ammonia, together with an opinion as to whether it be worth the price charged	10s.
4. An analysis of mineral superphosphate of lime for soluble phosphates only, together with an opinion as to whether it be worth the price charged	5s.
5. An analysis of superphosphate of lime, dissolved bones, &c., showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime and ammonia, together with an opinion as to whether it be worth the price charged	10s.
6. An analysis of bone-dust, basic slag, or any other ordinary artificial manure, together with an opinion as to whether it be worth the price charged	10s.
7. Determination of potash in potash salts, compound manures, &c.	7s. 6d.
8. An analysis of compound artificial manures, animal products, refuse substances used for manure, &c.	from 10s. to £1
9. An analysis of limestone, showing the proportion of lime	7s. 6d.
10. Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime	10s.
11. Complete analysis of a soil	£3
12. Analysis of any vegetable product	10s.
13. Determination of the "hardness" of a sample of water before and after boiling	5s.
14. Analysis of water of land-drainage, and of water used for irrigation	£1
15. Analysis of water used for domestic purposes	£1 10s.
16. Consultation by letter	5s.

Letters and samples (postage and carriage prepaid) should be addressed to the Consulting Chemist, Dr. J. AUGUSTUS VOELCKER, 22 Tudor Street, New Bridge Street, London, E.C.

The fees for analysis must be sent to the Consulting Chemist at the time of application.

Instructions for selecting, drawing, and sending samples for analysis will be found in the Society's "Book of Arrangements," or can be obtained on application to the Society's Office, Vincent Square, S.W.

EXTRACTS FROM THE PROCEEDINGS
OF THE
ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

MAY 9, 1911.

Mr. JOSEPH CHEAL in the Chair.

Fellows elected (98).—Mrs. Acheson-Gray, Mrs. C. H. Aldridge, T. J. Anderson, Mrs. W. Archer-Thomson, Miss A. J. Behrens, Miss Best, W. Binks, Miss A. Blest, Miss M. E. Cole Bowen, G. C. Breese, Mrs. H. L. Brooksbank, Mrs. A. Marshall Brown, Mrs. Finlay Campbell, Mrs. Carver, Philip Clark, Mrs. Graham Cooper, Mrs. S. T. Creet, Miss M. L. Croft, Mrs. H. P. Cross, J. S. Crowther, Mrs. Philip Dowson, Mrs. R. M. Driver, The Marchioness of Dufferin and Ava, Mrs. A. Durlacher, H. J. Elliott, John A. Findlay, Mrs. R. Fitton, Mrs. Hugh Fraser, Miss M. T. Gadesden, J. W. Galloway, Charles Garnett, F. L. Govett, H. P. Griffiths, Warner Halsey, Mrs. St. John Hankin, Mrs. J. C. Harker, Mrs. Leonard Harrison, Miss Hawkshaw, Mrs. A. Henderson, Mrs. M. W. Hervey, F. P. Hill, A. L. Hine-Haycock, G. F. Horbury, Miss A. L. Hough, Mrs. J. M. Hughes, W. Wellesley Humbley, J.P., Mrs. Jenkins, Miss A. H. Jones, Henry Knight, John Knight, Mrs. Lagemann, J. G. Lambert, Mrs. J. W. Langworthy, Miss G. A. S. Lausada, E. V. Law, Miss C. E. Le Rossignol, J. A. McBeath, A. S. McCrea, John H. Mackay, Miss E. Manning, Mrs. Masterman, Cecil Mocatta, James Moon, Mrs. F. A. Morris, Mrs. Moss-Cockle, Mrs. Oliphant, Miss E. A. Pemberton-Barnes, C. E. Percival, Mrs. C. E. Percival, Mrs. Roland Philipson, H. H. Platten, Mrs. Preston, Major-General Sir George Pretyma, K.C.M.G., C.B., Major T. M. Robinson, T. F. Roper, Lady Ross, D. Alroy-Salaman, J. A. B. Shalders, Mrs. James Shepherd, Lady Swaythling, T. B. Clarke Thornhill, Mrs. Roby Thorpe, Mrs. Trimmell, Miss K. Turner, C. D. Twopeny, Mrs. H. A. Vernet, Mrs. Walsh, Lady Richard Wellesley, J. Wickwar, George M. Williams, Mrs. M. Wingfield, Miss G. M. Woodall, W. S. Woodcock, Colonel J. R. Wright, C. H. Wyatt, M.A., Mrs. Cecil Wyatt, Caroline Lady Wynford, Mrs. Yarrow.

Fellows resident abroad (4).—Gilbert E. Brooke, M.A., L.R.C.P.

(Singapore), Anton Buchner (Munich), R. Heaton Rhodes (Canterbury, N.Z.), A. van Starrex (Ceylon).

Associates (3).—Miss E. Inglis, Miss G. M. Smith, W. Stewart.

Societies affiliated (2).—Sydenham Horticultural Society, Toowoomba (Queensland) Horticultural Society.

A lecture on "Alpine Gardens" was given by Monsieur H. Correvoon (see p. 80).

TEMPLE SHOW.

MAY 23, 24 AND 25, 1911.

JUDGES.

ORCHIDS.

Chapman, H. J.
Crawshay, de B.
Fowler, J. Gurney
Little, H.
Wellesley, F.

ROSES.

Jennings, John
May, H. B., V.M.H.
Orpen, O. G.
Shea, Chas. E.

CARNATIONS.

Barnes, N. F.
Blick, Chas.
Douglas, Jas., V.M.H.
Turner, Arthur

TULIPS.

Hall, A. D., M.A., F.R.S.
Jacob, Rev. J.
Ware, W. T.

FRUIT AND VEGETABLES.

Challis, T., V.M.H.
Nix, C. G. A.
Poupart, W.
Rollit, Sir Albert, D.L.

GROUPS IN THE OPEN AIR.

Crump, W., V.M.H.
Fielder, C. R., V.M.H.
Pearson, A. H., J.P., V.M.H.
Thomson, D. W.

HARDY HERBACEOUS PLANTS.

Beckett, E., V.M.H.
Boscawen, Rev. A.
Bowles, E. A., M.A.
Veitch, P. C. M., J.P.

ROCK AND ALPINE PLANTS.

Bilney, W. A., J.P.
Clutton-Brock, A.
Grandfield, J.
Lynch, R. Irwin, V.M.H.

FOLIAGE PLANTS.

Bain, W.
Baker, W. G.
Hudson, Jas., V.M.H.
McLeod, J. F.

FLOWERING PLANTS.

Chapman, A.
Howe, W.
Paul, Geo., V.M.H.
Reynolds, G.

MISCELLANEOUS.

Dixon, C.
Kingsmill, A.
Notcutt, R. C.
Odell, J. W.

AWARDS GIVEN BY THE COUNCIL AFTER CONSULTATION WITH THE JUDGES.

The order in which the names are entered under the several medals and cups has no reference whatever to merit, but is purely accidental.

The awards given on the recommendation of the Floral and Orchid Committees will be found under their respective reports.

Gold Medal.

Sir Jeremiah Colman, Gatton Park, Reigate (gr. Mr. J. Collier), for Orchids.

The Hon. Vicary Gibbs, Elstree (gr. Mr. F. Beckett, V.M.H.), for vegetables.

Messrs. Charlesworth, Haywards Heath, for Orchids.

Messrs. Cutbush, Highgate, for Carnations and Roses.

Messrs. Cuthbert, Southgate, for Azaleas.

Messrs. May, Upper Edmonton, for ferns and flowering plants.

Messrs. Mount, Canterbury, for Roses.

Messrs. Paul & Son, Cheshunt, for Roses.

Messrs. Wm. Paul, Waltham Cross, for Roses.

Mr. Amos Perry, Enfield, for alpine and hardy border flowers.

Messrs. Rivers, Sawbridgeworth, for fruit trees in pots.

Messrs. Sander, St. Albans, for Orchids.

Messrs. Sutton, Reading, for flowering plants.

Messrs. J. Veitch, Chelsea, for foliage plants.

Messrs. R. Wallace, Colchester, for flowering plants.

Silver Cup.

Samuel Larkin, Esq. (gr. Mr. G. Hale), Haslemere, for Orchids.

Messrs. Armstrong & Brown, Tunbridge Wells, for Orchids.

Messrs. Barr, Covent Garden, W.C., for hardy flowers.

Messrs. Blackmore & Langdon, Twerton-on-Avon, for Begonias.

Mr. H. Burnett, Guernsey, for Carnations.

Messrs. H. Cannell, Swanley, for Calceolarias, Pelargoniums, &c.

Messrs. B. Cant, Colchester, for Roses.

Messrs. J. Carter, Raynes Park, S.W., for Japanese garden and flowering plants.

Messrs. J. Cheal, Crawley, for rock garden and ornamental trees.

The Craven Nursery Co., Clapham, Yorks, for rock garden.

Messrs. W. Cutbush, Highgate, for rock, alpine, and herbaceous plants.

Messrs. A. Dickson, Newtownards, for Roses and Tulips.

Messrs. Dobbie, Edinburgh, for Sweet Peas, Pansies, and Violas.

Mr. Clarence Elliott, Stevenage, for alpine.

Messrs. W. Fromow, Chiswick, W., for Japanese Maples.

Messrs. Hobbies, East Dereham, for Roses.

Messrs. G. Jackman, Woking, for Clematis.

Messrs. Ker, Liverpool, for Amaryllis.

Messrs. Laxton, Bedford, for Strawberries.

Messrs. Mansell & Hatcher, Rawdon, Yorks, for Orchids.

Mr. L. R. Russell, Richmond, Surrey, for ornamental trees.

Mr. Chas. Turner, Slough, for Azaleas, Carnations, and Roses.

Messrs. J. Veitch, Chelsea, for flowering plants.

Messrs. T. S. Ware, Feltham, for Begonias.

Messrs. J. Waterer, Bagshot, for Rhododendrons.

Silver-gilt Flora Medal.

Messrs. Backhouse, York, for alpine and rock garden.

Messrs. Bakers, Wolverhampton, for rock garden and hardy plants.

Mr. C. Blick, Hayes, for Carnations.

Mr. A. J. A. Bruce, Chorlton-cum-Hardy, for Sarracenias.

Messrs. Frank Cant, Colchester, for Roses.

Messrs. J. Cypher, Cheltenham, for Orchids.

Messrs. J. Hill, Lower Edmonton, for ferns.

Mr. Frank Lilley, Guernsey, for Gladioli.

Messrs. Stuart Low, Bush Hill Park, Middlesex, for Orchids, Carnations, and Roses.

Messrs. McBean, Cooksbridge, for Orchids.

Mr. R. C. Notcutt, Woodbridge, for flowering shrubs.

Messrs. J. Peed, West Norwood, S.E., for Caladiums, &c.

Mr. M. Prichard, Christchurch, Hants. for hardy border flowers and alpines.

Messrs. Pulham, Newnan Street, W., for rock garden.

Mr. G. Reuthe, Keston, for alpines, flowering shrubs, &c.

Silver-gilt Banksian Medal.

Mr. B. E. Bell, Guernsey, for Carnations.

Mr. C. Engelmann, Saffron Walden, for Carnations.

The Guildford Hardy Plant Nursery, Guildford, for alpine and rock garden.

Messrs. Hogg & Robertson, Dublin, for Tulips, Gladioli, Irises, &c.

Messrs. J. Jefferies, Cirencester, for Tulips.

Messrs. J. Piper, Bayswater, for box and yew trees.

Messrs. Jones, Shrewsbury, for Carnations and Sweet Peas.

Silver Flora Medal.

Messrs. W. Artindale, Sheffield, for rock garden and hardy flowers.

Messrs. Bath, Wisbech, for Carnations and Tulips.

Mr. C. W. Breadmore, Winchester, for Sweet Peas.

Messrs. G. Bunyard, Maidstone, for Tulips and hardy flowers.

The Burton Hardy Plant Nursery, Christchurch, for alpine and rock garden.

Messrs. Clark, Dover, for hardy flowers.

Mr. H. H. Crane, Highgate, for Violas and Violettas.

Messrs. Cuthbert, Southgate, for Tulips.

Mr. H. Hemsley, Crawley, for rock garden and alpines.

Messrs. B. H. Ladhams, Southampton, for hardy flowers.

Dr. John MacWatt, Morelands, Duns, N.B., for Primulas and Auriculas.

Mr. G. Prince, Longworth, for Roses.

Mr. John Robson, Altrincham, for Orchids.

Messrs. Sutton, Reading, for Tulips.

Mr. C. F. Waters, Balcombe, for Carnations.

Messrs. Webb, Stourbridge, for Calceolarias.

Silver Knightian Medal.

Mr. A. J. Harwood, Colchester, for Asparagus and Primulas.

The Thatcham Fruit and Flower Farm, Newbury, for Carnations and vegetables.

Silver Banksian Medal.

Messrs. Bees, Liverpool, for new Primulas, alpinas, &c.

Messrs. Cocker, Aberdeen, for herbaceous plants.

Monsieur H. Correvon, Geneva, for alpinas.

Mr. A. F. Dutton, Iver, Bucks, for Carnations.

Messrs. John Forbes, Hawick, for Delphiniums and Pentstemons.

Messrs. G. Gibson, Bedale, for herbaceous flowers.

Messrs. Gunn, Olton, for hardy herbaceous plants.

Mr. A. Ll. Gwillim, Sidcup, for Begonias.

Messrs. R. Harkness, Hitchin, for Roses.

Messrs. Heath, Cheltenham, for rock garden.

The Misses Hopkins, Shepperton, for rock garden.

H. J. Jones Nurseries, Lewisham, for Sweet Peas, &c.

Messrs. Kelway, Langport, for Pyrethrums and Tree Paeonies.

The King's Acre Nurseries, Hereford, for hardy flowers.

Mr. W. H. Page, Hampton, for Zonal Pelargoniums.

Mr. R. Prichard, West Moors, for hardy flowers.

Messrs. F. Smith, Woodbridge, for herbaceous plants.

Mr. R. Stephenson, Cambridge, for Asparagus.

Messrs. Storrie & Storrie, Glencarse, N.B., for Auriculas.

Mr. R. Sydenham, Birmingham, for Sweet Peas and Lilies.

Messrs. Young, Cheltenham, for Carnations.

Bronze Flora Medal.

Mrs. E. Lloyd Edwards, Llangollen, for Saxifrages.

H. Vivian Philipps, Esq., Orpington, for Calceolarias.

Wickham Noakes, Esq., Croydon, for Calceolarias.

Messrs. Carter Page, London Wall, for flowering plants.

Mr. H. Dixon, Wandsworth, for Orchids.

Messrs. Godfrey, Exmouth, for Poppies.

Mr. John E. Knight, Wolverhampton, for Violas.

Messrs. E. V. Low, Haywards Heath, for Orchids.

Messrs. Seagrave, Sheffield, for Violas.

Mr. J. Stevenson, Wimborne, for Sweet Peas.

Messrs. W. Wells, Merstham, for Carnations.

GENERAL MEETING.

JUNE 6, 1911.

Sir ALBERT KAYE ROLLIT, LL.D., D.C.L., in the Chair.

Fellows elected (170).—Mrs. Acres, G. C. Addy, Lady Aird, R. S. Allen, H. A. Ansell, Mrs. Applethorpe, W. E. Arnold-Forster, J. G.

Bacon, Mrs. Bamber, Mrs. Banks, H. M. Bates, Mrs. A. A. Beale, Sir Henry Bell, Lady Bell, W. D. Besant, B. P. Bidder, W. S. T. Biggs, H. C. Bird, H. C. Bond, F. K. Borrow, H. Bostock, Mrs. F. L. Bradley, R. Bravington, F. T. Brooks, Mrs. Bull, Lady Bushman, Miss L. M. Busk, W. Butler, Mrs. Gordon Canning, H. S. Cayer, R. Charlton, H. F. Cheese, P. Chennell, Lyonel Clark, W. G. Clarke, Miss Clauson-Thue, K. Claye, Colonel Hon. H. Corry, H. Czarnikow, Lieut.-Colonel J. G. S. Davies, Mrs. R. Davies, Mrs. F. A. Davis, Mrs. Dugdale, Lieut.-Colonel W. H. M. Duthie, E. Elgar, H. J. Etchell, George Evans, Mrs. Ianto Evans, F. Farnan, Miss F. Fergusson, E. C. Fester, Mrs. Firmini, J. F. Fletcher, Mrs. P. W. Flower, B. C. Fothergill, Sir Benjamin Franklin, K.C.I.E., T. J. Gamnag, Miss E. Garland, Mrs. G. Aldridge George, E. G. Godfrey, Lady Gordon, Rev. R. E. P. Gorrington, Mrs. A. Gosling, Mrs. J. Graham, Miss L. Grant, Mrs. J. H. Townsend Green, G. Greensmith, L. S. Harbutt, Mrs. H. Harper, C. F. Hartung, R. E. Hellyer, R. W. Henderson, A. Heppleston, W. N. Hicking, Mrs. H. T. Hines, W. D. Hitchcock, P. W. Holden, Mrs. Holding, E. P. Hollams, Mrs. Holmes, J. Horwood, T. C. Huxley, T. L. Ingram, H. Jordan, Mrs. Scott Kemp, Captain J. Ker, W. Lawrenson, E. Lazenby, G. H. Lees, Lord Leigh, A. W. Lepper, Mrs. A. Levine, Mrs. M. Little, Miss H. Livesay, Major R. Lombe, Captain W. H. B. Long, F. J. Long, Mrs. A. K. Lloyd, R. H. Lunn, Lady Marshall, Mrs. H. A. Matthews, R. M. Matlocks, Miss B. Maxwell, Miss S. Meeson, Mrs. Menzies, Mrs. W. Mildmay, Mrs. H. R. Mill, Lady Miller, Mrs. W. Neall, Mrs. J. H. Nelson, Lady O'Malley, Mrs. Orred, W. Patchitt, Mrs. E. H. Peacock, C. W. D. Pigott, Lady Pole-Carew, J. Preece, Mrs. Prevost, Mrs. R. Raphael, A. Rayner, Miss A. G. Rees, W. Richards, Lady Riddell, W. Roberts, Mrs. J. S. Robertson, Mrs. T. Robinson, F. Rushby, F.R.G.S., Mrs. G. Saint, Mrs. L. W. Sedgwick, Lady Shuttleworth, Miss E. T. Sinclair, Sir Douglas Sladen, L.L.B., L. J. Sly, J. Solomon, Miss M. Smith, C. H. Spicer, W. J. Stalker, Mrs. Strahan, Mrs. Strauss, Miss F. M. Strype, F. Swanzy, B. H. B. Symons-Jeune, Mrs. Tasker, Mrs. Terry, Mrs. Thackthwaite, C. Hamblen Thomas, A. J. Thompson, T. Tidy, Miss F. Tranter, Inigo Triggs, J. Tully, Rev. H. J. Freake Van, Mrs. C. Vidal, J. B. Walker, G. W. Wallace, Major-General F. W. Ward, Mrs. Ward, J. Wasley, T. Whalley, Mrs. J. Bourne Wheeler, Sir Beethom Whitehead, K.C.M.G., Mrs. R. B. Whitehead, G. H. Wilkinson, Dr. J. Leon Williams, Mrs. Wilson, Mrs. Russell Wing, W. T. Woodhams, G. W. Worrall, H. S. Yates, Mrs. James Yeo.

Fellows resident abroad (8).—Mrs. H. Bevan (Victoria, B.C.), H. Pollman Evans (Toronto), William Harris (Helensville, N.Z.), Baron Heeckeren (Delden, Holland), F. S. Sillitoe (Khartoum), T. J. Leonard (Gatooma, Rhodesia), R. W. G. Shoobridge (New Norfolk, Tasmania), Alfred Unger (Heidelberg).

Associates (4).—D. Anderson, T. H. Bath, W. J. Cheeseman, J. McGeehan.

Societies affiliated (5).—Bournemouth Horticultural Society, Herefordshire Spring Flower Society, Hound and St. Mary Horticultural Society, Frowbridge Floricultural Society, Wordsley Horticultural Society.

A lecture on "The Past History of Conifers" was given by Professor A. C. Seward, F.R.S.

GENERAL MEETING.

JUNE 20, 1911.

Professor G. S. BOULGER, F.L.S., in the Chair.

Fellows elected (92).—M. A. Bailey, Miss F. Bateson, Mrs. Harold L. Behrens, Mrs. Belville, R. Bolton, H. Boyd, Miss F. E. A. V. Brenan, W. Broad, H. Burgess, Rev. E. R. Burroughes, J. Cairns, Captain R. A. Coote, D. J. Crump, Mrs. Elliott-Cooper, S. T. Evans, Staff-Surgeon C. B. Fairbank, R.N., W. G. Fenn, G. Figgis, J. C. Fort, T. G. Frost, W. G. Furniston, Mrs. Garrick, W. J. Gibbon, T. S. Girdler, F. W. Godding, W. M. Grant, Miss B. Gruning, R. Haines, A. Hamilton, Mrs. C. B. Haukey, C. A. Harrison, Miss E. Harrison, Mrs. R. J. Harrison, R. Hauptmann, Mrs. E. S. Carne Hill, G. C. Hindley, Miss Hohler, Mrs. P. D. Holt, Mrs. Hustler, D. H. Illingworth, Mrs. M. L. Jacks, Mrs. E. P. Jobson, J. Johnson, G. A. Jones, Mrs. S. S. Joseph, Mrs. Karslake, Mrs. Kerrich, E. J. Khory, Mrs. R. Knowles, Mme. Koch, Mrs. F. Laing, Mrs. Lampson, E. H. M. Lucock, Rev. J. C. Le Mesurier, Mrs. Lloyd, J. R. Lloyd-Williams, Mrs. J. R. Lloyd-Williams, Mrs. A. P. Luff, P. W. McDougall, Mrs. T. H. Mann, T. H. Mann, Mrs. C. T. Maw, Mrs. Z. Merton, C. D. Miller, G. A. Miller, T. J. Moody, P. Newhouse, Mrs. Oates, M. B. O'Donnell, Mrs. F. S. Oliver, Mrs. G. Oliver, G. E. Phipps, Mrs. Prehn, Mrs. P. B. Reckitt, Mrs. T. A. Roberts, Colonel H. D. Robson, A. Simmonds, H. B. Simpson, C.B., Mrs. Sitwell, Mrs. Smith, Mrs. J. Smith, Mrs. Sprague, A. Stannah, J. Swinbank, A. Swinnens, Captain W. Taylor, Mrs. E. Upton, Mrs. Wallace, W. N. Wengate, H. E. Wright, Miss A. Wyrley-Birch, Miss D. A. Young.

Fellows resident abroad (4).—Mrs. M. M. Boyd (Ontario), Mrs. Herbert Brown (Okuka, N.Z.), James Kirker (Auckland, N.Z.), Mrs. O. P. Wethered (Teneriffe).

Associates (2).—E. S. Pigg, B. J. Ralph.

Society affiliated (1).—Ashburton (N.Z.) Horticultural Society.

A lecture on "The Origin of Monocotyledons from Aquatic Dicotyledons" was given by the Rev. Professor G. Henslow, M.A., F.L.S., V.M.H. (see p. 289).

OLYMPIA SHOW.

JULY 4, 5 AND 6, 1911.

JUDGES.

ORCHIDS.

Chapman, H. J.
Crawshay, de Barri
Fowler, J. Gurney
Little, H.
Shill, J. E.
Wellesley, F.

ROSES.

May, H. B., V.M.H.
Mease, W.
Page Roberts, Rev. F.

CARNATIONS.

Douglas, Jas., V.M.H.
Jennings, J.
MacLeod, J. F.
Turner, Arthur

BEGONIAS AND SUNDRY PLANTS.

Blick, C.
Chapman, A.,
Odell, J.

SWEET PEAS.

Bates, W.
Gordon, Geo., V.M.H.
Stevenson, T.

FRUIT AND VEGETABLES.

Challis, T., V.M.H.
Nix, C. G. A.
Poupart, W.
Rollit, Sir Albert, D.L.

HERBACEOUS PLANTS ON TIERS.

Beckett, E., V.M.H.
Boscawen, Rev. A.
Cheal, Jos.
Dorrien-Smith, Capt. A.
Lynch, R. Irwin, V.M.H.
Noteutt, R. C.

HERBACEOUS PLANTS ON TABLES.

Grandfield, J.
Hales, W.
Shea, C. E.

ROCK, ALPINE, AND WATER GARDENS.

Bedford, A.
Bilney, W. A., J.P.
Bowles, F. A., M.A.
Divers, W. H.

FOLIAGE PLANTS.

Bain, W.
Baker, W. G.
Hudson, Jas., V.M.H.
Wythes, Geo., V.M.H.

OTHER FLOWERING PLANTS.

Howe, W.
Reynolds, G.
Turner, T. W.

HORTICULTURAL SUNDRIES.

Cuthbertson, W.
Davis, J.
Dixon, C.
Pearson, C. E.
Ware, W. T.
Woodward, G.

OLYMPIA CUP—ROSES.

Fielder, C. R., V.M.H.
Grant, J.
Piper, Thos., Junr.

SHERWOOD CUP—FRUIT.

Coomber, T., V.M.H.
Pearson, A. H., J.P., V.M.H.
Thomas, Owen, V.M.H.

CORONATION CUP.

The most meritorious Exhibit.
The Council.

AWARDS GIVEN BY THE COUNCIL AFTER CONSULTATION WITH THE JUDGES.

The order in which the names are entered under the several medals and cups has no reference whatever to merit, but is purely accidental.

The awards given on the recommendation of the Fruit, Floral, and Orchid Committees will be found under their respective reports.

Gold Medal.

Messrs. J. Carter, Raynes Park, for a Japanese garden.

Messrs. Charlesworth, Haywards Heath, for Orchids.

Mr. Hugh Dickson, Belfast, for Roses.

Messrs. Dobbie, Edinburgh, for Sweet Peas.

Mr. Amos Perry, Enfield, for Delphiniums.

Messrs. T. Rivers, Sawbridgeworth, for fruit trees in pots.

Mr. L. R. Russell, Richmond, for standard and tree Ivies.

Messrs. James Veitch, Chelsea, for stove plants and Fuchsias.

Messrs. R. Wallace, Colchester, for a natural water and formal garden.

Coronation Cup.

Messrs. H. B. May, Chingford, for hardy and exotic ferns.

Olympia Cup.

Messrs. W. Paul, Waltham Cross, for Roses.

Sherwood Cup.

Duke of Portland, K.G., Welbeck Abbey, Worksop (gr. J. Gibson), for a collection of British-grown fruit.

R.H.S. Silver Cup.

Sir Randolph Baker, Bart., Ranston House, Blandford (gr. Mr. A. E. Usher), for Sweet Peas.

Cecil F. Raphael, Esq., Porter's Park, Shenley (gr. Mr. A. Grubb), for Melons and vegetables.

Mr. B. E. Bell, Guernsey, for Carnations.

Messrs. Blackmore & Langdon, Twerton-on-Avon, for Begonias.

Messrs. G. Bunyard, Maidstone, for fruit trees and herbaceous flowers.

Mr. H. Burnett, Guernsey, for Carnations.

Messrs. J. Cheal, Crawley, for a small garden with lawn.

Messrs. W. Cutbush, Highgate, for a rock and water garden, Carnations, &c.

Messrs. W. Fromow, Chiswick, for Japanese Maples.

Messrs. Gunn, Olton, for Phloxes and alpinas.

Messrs. J. Hill, Lower Edmonton, for hardy and exotic ferns.

Messrs. Mansell & Hatcher, Rawdon, for Orchids.

Messrs. Paul & Son, Cheshunt, Herts, for Roses.

Mr. Maurice Prichard, Christchurch, for a water garden.

Messrs. Pullham, 71 Newman St., W., for a rock garden.
 Messrs. Sutton, Reading, for vegetables and Sweet Peas.
 Mr. Charles Turner, Slough, for Carnations and Roses.
 Messrs. Webb, Stourbridge, for Sweet Peas, vegetables, and Melons.
 Messrs. Low, Enfield, for Orchids, Carnations, and Roses.

Silver-gilt Flora Medal.

E. J. Johnstone, Esq., Burrswood, Groomsbridge (gr. A. T. Paskett), for Carnations.

Messrs. Barr, Covent Garden, W.C., for Japanese dwarf trees and hardy flowers.

Mr. J. Box, Lindfield, for Delphiniums, Gladioli, and Sweet Peas.

Mr. A. F. Dutton, Iver, Bucks, for Carnations.

Messrs. Kelway, Langport, for Delphiniums and Sweet Peas.

Messrs. E. W. King, Coggleshall, for Sweet Peas.

Mr. Frank Lilley, Guernsey, for summer flowering Gladioli.

Messrs. J. Peed, West Norwood, for Caladiums and flowering plants.

Messrs. F. Sander, St. Albans, for Orchids.

Messrs. T. S. Ware, Feltham, for Begonias and alpines.

Silver-gilt Knightian Medal.

H. S. Barton, Esq., Hewshot House, Liphook (gr. F. Streeter), for vegetables.

S. Heilbut, Esq., Holyport, Maidenhead, for fruit trees in pots.

The King's Acre Nurseries, Hereford, for fruit trees in pots.

Silver-gilt Banksian Medal.

Messrs J. Carter, Raynes Park, for flowering plants.

Messrs. B. R. Cant, Colchester, for Roses.

Messrs. Clark, Dover, for hardy plants.

Messrs. G. Jackman, Woking, for Clematis and hardy flowers.

Mr. J. Mattock, Oxford, for Roses.

Mr. R. C. Notcutt, Woodbridge, for Roses and hardy flowers.

Mr. G. Prince, Oxford, for Roses.

Mr. C. F. Waters, Balcombe, for Carnations.

Silver Flora Medal.

Mr. W. E. Alsen, Denmead, Hants, for Sweet Peas.

Messrs. S. Bide, Farnham, Surrey, for Sweet Peas.

Mr. C. W. Breadmore, Winchester, for Sweet Peas and Carnations.

Messrs. H. Cannell, Swanley, for Begonias.

Messrs. Carter Page, London Wall, for Sweet Peas.

Messrs. A. Dickson, Newtownards, for Roses.

Mr. C. Engelmann, Saffron Walden, for Carnations.

Messrs. John Forbes, Hawick, for Phloxes and Delphiniums.

Messrs. Hobbies, East Dereham, for Roses.

Messrs. Jones, Shrewsbury, for Sweet Peas, Carnations, &c.

Messrs. B. Ladhams, Shirley, Hants, for hardy flowers.

Messrs. J. Piper, Barnes, Surrey, for Fuchsias and topiary work

Mr. G. Reuthe, Keston, for hardy flowers and alpine.
 Mr. L. R. Russell, Richmond, S.W., for stove and foliage plants.
 Messrs. Seagrave, Sheffield, for Violas, Pansies, &c.
 Messrs. F. Smith, Woodbridge, for hardy border flowers.
 Mr. R. Sydenham, Birmingham, for Sweet Peas.
 Messrs. G. Stark, Great Ryburgh, for Sweet Peas.
 Messrs. J. Veitch, Chelsea, for flowering plants.

Silver Knightian Medal.

Messrs. Laxton, Bedford, for Strawberries.
 The Locksheath Nurseries, Southampton, for fruit, &c.
 The New Zealand Government, Victoria Street, S.W., for apples.
 The Swanley Horticultural College, Kent, for fruit.

Silver Banksian Medal.

Messrs. R. H. Bath, Wisbech, for Carnations and hardy flowers.
 Messrs. Brown, Stamford, for Roses.
 Mr. H. H. Crane, Highgate, N., for Violas.
 The Craven Nursery, Clapham, Yorks., for a rock garden.
 Messrs. G. Gibson, Bedale, for hardy flowers.
 The Guildford Hardy Plant Nursery, for herbaceous flowers.
 Mr. A. J. L. Gwillim, Sidcup, for Begonias.
 Messrs. R. Harkness, Hitchin, for Roses.
 Messrs. Jarman, Chard, for Centaureas and Sweet Peas.
 Mr. G. Lange, Hampton, Middlesex, for Carnations.
 Mr. E. V. Low, Haywards Heath, for Orchids.
 Mr. S. Mortimer, Farnham, Surrey, for Cucumbers.
 The Somerford Nurseries, Christchurch, for Carnations.
 Mr. J. D. Webster, Chichester, for Sweet Peas and Carnations.
 Messrs. Whitelegg and Page, Olisichurst, for hardy flowers.
 Messrs. Young, Cheltenham, for Carnations.

Bronze Flora Medal.

Frank May, Esq., Radlett, Herts. (gr. T. F. Stannett), for Carnations.

Mr. H. Dixon, Wandsworth Common, for Orchids.
 Mr. H. Hemsley, Crawley, for alpine and hardy flowers.
 H. J. Jones Nurseries, Lewisham, S.E., for Pelargoniums.
 Messrs. J. K. King, Coggeshall, for Sweet Peas.
 Messrs. W. Wells, Merstham, for Phloxes and Pentstemons.
 Mr. Carlton White, New Bond Street, W., for clipped trees.

Bronze Knightian Medal.

The Misses Le Lacheur and Sherris, Henfield, Sussex, for Melons.

Bronze Banksian Medal.

Mr. W. Deal, Kelvedon, for Sweet Peas.
 Mr. W. H. Paine, The Tully Nurseries, Kildare, for Anemones and Delphiniums.

HORTICULTURAL SUNDRIES.

Silver-gilt Flora Medal.

Messrs. W. Wood, Wood Green, N., for manures, insecticides, and garden furniture.

Silver-gilt Banksian Medal.

Messrs. Chas. P. Kinnell, Southwark, for heating apparatus, &c.

Messrs. Liberty, 28 Warwick Street, W., for garden pottery.

Mr. W. Poupart, Twickenham, for bottled fruits and sterilizers.

Silver Flora Medal.

The Alpha Extinguisher, Hereford, for sprayers, &c.

Castle's Shipbreaking Co., for teakwood garden furniture.

The Four Oaks Syringe Co., Sutton Coldfield, for syringes, pumps, &c.

Mr. John P. White, Bedford, for garden seats, chairs, &c.

Silver Banksian Medal.

Messrs. Abbott, Southall, for table trays and bee hives.

The Coldrum Pottery Co., 11 Sloane Street, S.W., for Coldrum pottery.

Mr. Alex. Hamilton, Olaf Street, W., for tubs, seats, chairs, &c.

Messrs. H. Hartjen, 35 Noble Street, E.C., for spraying machines.

The Leyton Timber Co., Leyton, for rustic and horticultural goods.

Messrs. Lloyd Lawrence, 29 Worship Street, E.C., for Pennsylvania lawn mowers.

Messrs. Maggs, Clifton, for teak garden seats, tables, &c.

Messrs. R. Sankey, Nottingham, for garden pottery.

The Thames Bank Iron Co., Upper Ground Street, S.E., for greenhouse boilers and hot-water fittings.

Messrs. W. Duncan Tucker, 27 Cannon Street, E.C., for greenhouses and garden frames.

Bronze Flora Medal.

Messrs. Blake and Mackenzie, Liverpool, for waterproof flower pots.

The Permanent Printing Co., 2 Sandland Street, W.C., for "Ivo" labels.

Mr. R. Pinches, Crown Street, S.E., for labels, exhibition boxes.

Messrs. Pulham, 71 Newman Street, W., for vases and garden ornaments.

The Selborne Society, Brent Valley Branch, for nesting boxes.

Messrs. C. Toope, Stepney Square, E., for heating apparatus.

Messrs. E. A. White, Paddock Wood, for insecticides.

Bronze Banksian Medal.

Messrs. W. Cooper and Nephews, Berkhamsted, for spray fluids, pumps, &c.

Messrs. J. Crispin, Bristol, for portable buildings.

Messrs. D. Dowel, Hammersmith, for orchid pottery.

Mr. J. Haws, Clapton, N.E., for watering cans.

Jeyes' Sanitary Compounds Ltd., for spraying fluids.

Messrs. Jules Lang, 16 Bury Street, E.C., for preserving bottles and rose bowls.

The Patent Safety Ladder Co., Peterborough, for patent safety extension ladders.

Messrs. H. Pattisson, Streatham, for horse boots.

Messrs. Pearce, 644 Holloway Road, N., for greenhouse and heating apparatus.

The Tilehurst Pottery Co., Reading, for garden pottery.

Messrs. W. Voss, Millwall, for fertilizers, fumigators, &c.

PRESS LUNCHEON.

AN informal luncheon was given to the Press at Olympia on July 3, Sir Albert Rollit, LL.D., Litt.D., being in the Chair. Addressing the representatives, Sir Albert said:—

“The only toast which will be submitted to you is ‘The Summer Flower Show at Olympia,’ and it will have for its response the hearty hope of all that it may be successful. For many years we have, by the most kind permission of Mary, Countess of Ilchester, held our Summer Show at Holland House, a house not only notable for its history and traditions, but also, from the horticultural point of view, for its own beautiful and varied gardens and for the great privilege which has been accorded to us by her Ladyship in lending its grounds for our Shows. Whatever success we may have at Olympia, and I believe it will be very great, will not—it cannot—overshadow the gratitude we all feel towards Lady Ilchester for her kindness in the past, and I am sure that every one connected with our Society cherishes the hope that we may some day be allowed to return to Holland House again; and though this year we cannot help regretting the beautiful green trees and cool turf underfoot, we certainly shall not forget the great service rendered to the Society by Lady Ilchester in so often allowing us the enjoyment of them in the past.

“Our new home is at Olympia; and the first welcome we give is to the members of the Press. We are very glad to see them there as guests, and, on behalf of the President and Council, we are prepared to be very grateful to them for helping us to make our first Show here, which is to some extent an experiment, the great success which we hope it will be. We offer them our thanks for their attendance to-day, and also for their willingness to help us in such a very good and public cause. I call it a good cause because we believe that flowers are educative in the best and widest sense of the term. They also beautify and refine our minds and homes—*Emolliunt mores nec sinunt esse feros*. I have known many a home of a quite humble character whose interior life was evidenced at once by the flowers upon the window-sill; and many an imprisoned mind has been set free by the

cultivation in backyards of the East End of London of a few Irises, Chrysanthemums, and suchlike. The more we can build up from such foundations, and the more we can cultivate the love of plants and flowers, the better for the country and for all classes. Happily an organization exists for this purpose in the Royal Horticultural Society. I have no sympathy whatever with the pessimists who decry our trade and commerce; but whatever they may say of some industries, in the horticultural trade at any rate we are at the head of the whole world. There is a vast capital invested in it; and we ought to do all we can to foster it and to make our land even more a garden than it is. When foreigners come to this country, they speak of it as a garden in which they delight, with its trees, its ample vegetation, its velvet turf, and its abundant greenery; they admire England the more because of the plants and flowers which we cultivate; and we ought to do all we can to encourage that love, and with it the love of the olive branch, the emblem of safety and of peace. So we want the Press to help us, by doing all they can to encourage people to take an interest in what we believe to be a very great and beneficent movement. Horticulture is a flourishing art; it is a healthy occupation; it is a most instructive recreation; and it is a means for the artistic decoration of our homes and the improvement of the homes of the people. Fruit and vegetables are also a most wholesome food and diet. But the cost of illustrating all this and giving it publicity by our Exhibitions is very large, and we rely upon the Press to assist us in making this Show at least self-supporting.

“The rewards to be given as prizes are most ample. The Coronation Challenge Cup is a splendid trophy; there is also a handsome silver-gilt cup given by Olympia, and the beautiful Sherwood Cup, besides the usual medals and certificates, etc. The Society has done all it can to draw in exhibitors, and the success of the Show is from that point of view assured. Its success financially rests to a very large extent with you, the representatives of the Press, and in your hands we confidently leave it.”

LUNCHEON TO THE COLONIAL GOVERNORS AND OFFICIALS OF THE BRITISH COLONIAL EMPIRE.

THE presence of so many Colonial visitors in London during 1911 suggested an opportunity to meet socially many influential friends of the Society from the Overseas Dominions with whom the President and Council have been in touch for many years past in connexion with the Society's exhibitions of Colonial fruit and the gifts to the Colonies of plants and seeds. The Society's great Summer Show at Olympia on July 5 afforded a convenient occasion for such a gathering, and invitations to the Show and to luncheon were accordingly issued. Every one of prominence in any of the Colonies who was known to be in London was invited, and the following is a list of those who accepted:—

- Aitken, Thos.
 Alleyne, Forster.
 Aspinall, Algernon E., Secretary, West India Committee.
 Bamber, M. Kelway, of Ceylon.
 Barth, Mr. Justice, of British East Africa.
 Belcher, Lieut.-Col. R., C.M.G., of Edmonton, Alberta.
 Bertin, Henry, of Mauritius.
 Boosé, J. R., Secretary, Royal Colonial Institute.
 Boulger, Prof. G. S., F.L.S., City of London College.
 Boyle, Sir Cavendish, K.C.M.G., Governor of Mauritius.
 Bridges, Rear-Admiral W., of Victoria.
 Campbell, Hon. Colin H., K.C., Attorney-General of Manitoba.
 Carinody, Professor, Trinidad.
 Carter, Sir Gilbert, K.C.M.G., late Governor of Trinidad.
 Chiappini, C. du P., Trades Commissioner in London for S. Africa.
 Clarke, Walter Child.
 Chomley, His Honour Judge, of Victoria.
 Clarke, His Honour Sir F., Chief Justice of Jamaica.
 Colman, Sir Jeremiah, Bart., Treasurer of the International Hort.
 Exhibition.
 Crewe, D., J.P., of New Zealand.
 Crossman, Charles R., Secretary of the Sydney Hort. Society.
 Davidson, H.E. Walter, Governor of Seychelles Islands.
 Davidson-Houston, Lieut.-Col. W. B., Commissioner of Mont-
 serrat.
 Dorrien-Smith, Capt. A. A.
 Duncan, The Hon. J. J., Member of the Legislative Council of
 South Australia.
 Earp, The Hon. George, Member of the Legislative Council of New
 South Wales.
 Ebbelwhite, E. A., Clerk of the Gardeners' Company.
 Elliott, Sir Thos. R., K.C.B., Secretary of the Board of Agriculture
 and Fisheries.
 Evans, Maurice S., C.M.G., of Natal.
 George, Joseph W. C.
 Godfrey, George, of Victoria.
 Gomme, Sir Laurence, London County Council.
 Gould, Sir Albert J., C.B., President of the Federal Senate of the
 Commonwealth Parliament of Australia.
 Griffith, W. L., Secretary for the Dominion of Canada.
 Grindle, G. E. A., Chief of the West Indies Department, Colonial
 Office.
 Gueritz, E. P., Governor of British North Borneo.
 Hall-Jones, Hon. Sir W., High Commissioner for New Zealand.
 Hewlett, J. C., Renter Warden of the Fruiterers' Company.
 Holford, Sir George, K.C.V.O., C.I.E., Equerry to his late Majesty
 King Edward VII.
 Howard, J., Agent-General for Nova Scotia.

Hudson, Arthur, K.C., Judge of the Supreme Court, Sierra Leone.
Hulett, Senator the Hon. Sir James Liege, Union of South Africa.

Hunt, Atlee, C.M.G., Secretary for External Affairs, Commonwealth of Australia.

Hyndman-Jones, Sir Wm. H., Chief Justice of the Straits Settlements.

Kidd, Alfred, of New Zealand.

King, Colonel Wallis, M.V.O., of the Naval and Military Tournament.

Kirkpatrick, The Hon. A. A., Agent-General for S. Australia.

Lawrence, Sir Trevor, Bart., K.C.V.O., President of the Royal Horticultural Society.

Llewellyn, Sir John, Bart., Vice-President of the Royal Horticultural Society.

Lucas, Sir Charles, K.C.M.G., Secretary for the Dominions at the Colonial Office.

McCarthy, R. H., Govt. Director, Trinidad Dock Co.

Michell, The Hon. Sir Lewis, of Cape Town.

Mills, Sir James, K.C.M.G., of New Zealand.

Moore, The Hon. Sir Newton, Agent-General for Western Australia.

Morris, Sir Daniel, K.C.M.G., late Commissioner for Agriculture in the West Indies.

Neisterstein, Capt. F. W., of New South Wales.

Perth, The Rt. Rev. the Bishop of, of Western Australia.

Prain, Lieut.-Col. W. D., F.R.S., Director of the Royal Gardens, Kew.

Rayner, Sir Thos. Crossley, Attorney-General, British Guiana.

Reid, The Rt. Hon. Sir G. H., High Commissioner for Australia.

Rendle, Dr. A. B., F.R.S., Natural History Museum.

Robinson, Major Sir Thomas, Agent-General for Queensland.

Rollit, Sir Albert, D.L., Member of the London Chamber of Commerce.

Russell, Sir William, of New Zealand.

Rutherford, K., of the West India Committee.

Sheriff, The Hon. P., of St. Lucia.

Shoobridge, R. W. C., of Tasmania.

Stockdale, F. A., B.A., F.L.S., of the West Indies.

Symons, Senator Sir Josiah, of Australia.

Turner, The Hon. J. H., Agent-General for British Columbia.

Wardill, Major B. J., of Victoria.

Wickham, H. A., of Papua.

Wilmot, The Hon. A., Member of the Legislative Council, Cape Colony.

Wittenoom, The Hon. Sir Edward, of Western Australia.

Young, The Hon. Sir James, Member of the Executive Council, Bahamas.

TOAST LIST.

1. THEIR MAJESTIES KING GEORGE AND QUEEN MARY.

Proposed by THE PRESIDENT, SIR TREVOR LAWRENCE,
BART., K.C.V.O.

2. THE BRITISH EMPIRE AND OUR GUESTS THE PREMIERS,
GOVERNORS, COMMISSIONERS, AND OTHER VISITORS FROM
THE OVERSEAS DOMINIONS.

Proposed by SIR DANIEL MORRIS, K.C.M.G., D.C.L.,
D.Sc., V.M.H.

Response by SIR ALBERT J. GOULD, C.B.

3. THE ROYAL HORTICULTURAL SOCIETY.

Proposed by SIR THOMAS ELLIOTT, K.C.B.

Response by SIR ALBERT ROLLIT, D.C.L., LL.D.

4. THE PRESIDENT.

Proposed by THE HON. J. H. TURNER.

Luncheon finished,

The PRESIDENT said that he was thankful the toast of His Most Gracious Majesty the King and Her Most Gracious Majesty the Queen, which he had the honour to propose, required, under any circumstances, very little introduction in this country; but, on behalf of the R.H.S., he would like to give a word of welcome to their many guests, of whom he would have liked to see even more. He was very pleased indeed to see them and he was sure that no horticulturist was present who did not feel that they all belonged to one family. Many of the visitors were from our Colonial possessions; and the feeling in this country was that whenever, if ever, the Mother Country found itself in difficulties it could count upon getting all the help they could give from the Colonies. He thought the spirit of patriotism which animated them all round could not be better illustrated than by the story of a well-known officer who lost his life in the Indian Mutiny. He was one of a family who gave many lives to the defence of their country, and when he was told he could not survive his wound, he smiled and quoted the old Latin tag, "Dulce et decorum est pro patriâ mori." That feeling animated English, Scotch, and Irish wherever they might be. He thought they would agree with him in saying that their Majesties had shown a most gracious cordiality in every direction towards the visitors who had come from all parts of their Dominions; and he thought they had all been most anxious to follow the admirable example of their Majesties in showing a warm sympathy towards their countrymen beyond the seas.

The Toast was duly honoured.

In proposing the toast of "The British Empire and our Guests the Premiers, Governors, Commissioners, and other visitors from the Overseas Dominions," SIR DANIEL MORRIS, K.C.M.G., D.C.L., D.Sc., V.M.H., said he felt honoured in being entrusted with the toast of the day. In the system of benevolent despotism exercised by his friend the admirable Secretary of the Society it was impossible to evade his com-

mands; but this occasion was a special one and it afforded him great pleasure on behalf of the Council of the Society to offer a hearty welcome to the visitors from the Overseas Dominions. The Royal Horticultural Society for more than a hundred years had kept in touch with various parts of the Empire. In its early days it had despatched collectors to explore and bring to this country a number of notable plants which had been cultivated in the Society's Gardens and distributed to the Fellows and through them to the public at large. The Far East, West and East Africa, Australia, the West Indies and Western Canada had all been visited in turn and their floral treasures made known and introduced into British gardens. Among the collectors employed the most prominent were Douglas and Fortune. Douglas introduced not only several notable coniferous trees, such as the *Wellingtonia*, Redwood, the well-known and admired Douglas fir, and *Pinus insignis*, but he brought over such now familiar plants as the flowering currant, *Ceanothus*, *Gaillardias*, *Clarkias*, *Lupins*, *Peustemons*, *Mimulus*, and *Eschscholzias*. This was eighty years ago. Fortune some twenty years later explored parts of China and introduced the Chusan daisy, the parent of the *Pompon Chrysanthemum*. He was afterwards employed by the Indian Government in introducing the Chinese tea-plant into Assam (where later the indigenous tea was found) and in taking part in experimental plantations, which probably laid the foundation of the present colossal tea industries of India and Ceylon. It is not too much to say that through the efforts of the Royal Horticultural Society, involving a large expenditure extending over a long period of years, the most notable plants found in various parts of the Empire were so widely distributed that there is hardly a garden existing in any part of the British Islands or of the Colonies that is not richer to-day for the Society's efforts.

It is only right in this connexion to mention also the services rendered by the Royal Gardens of Kew. The successive Directors of that establishment were instrumental in securing the publication of a series of useful Handbooks dealing with the floras of various parts of the Empire. Amongst these were the flora of British India, by Sir Joseph Hooker, the flora of Australia, by Baron von Müller and Mr. Bentham, and the flora of New Zealand, by Sir Joseph Hooker. The floras of Mauritius, Hong-Kong, and the West Indies are also worthy of mention. More recently the floras of tropical Africa and the Cape have been dealt with. Kew has also trained and sent out a band of capable men to take charge of Colonial Botanic Gardens and assist in developing Colonial industries.

Possibly the most notable effort of the Royal Horticultural Society in the interest of the Overseas Dominions in recent years has been the organization of a series of successful Colonial Fruit Shows. The first was held in 1904, the year when was celebrated the centenary of the Society and the building of the new Hall. This was also the Jubilee year of the Colonial Office. They were glad to welcome among them Sir Charles Lucas and Mr. Grindle as representatives of that Office to-day. It was also the year when the West India Committee, which

looks after the interests of the West Indies in London, received its Charter.

The Colonial Fruit Show held in December last, opened by Sir Edward Grey, was one of the most remarkable of any. No less than five hundred cases of beautiful apples, weighing in the aggregate thirty tons, were received from British Columbia. They had travelled nearly eight thousand miles and yet were in perfect condition. Very attractive fruit was also received from Ontario and Nova Scotia, as well as from the West Indies, Malta, Cyprus, and New Zealand.

These Shows were organized with the object of advancing the interests of various parts of the Empire. There is no doubt they have afforded valuable means for bringing before the people of this country the great possibilities existing in our Colonies. It is intended in March of next year to arrange a Fruit Show for the Union of South Africa. A telegram had been sent by Lord Gladstone from Pretoria to the effect that "South Africa was prepared to support the suggested exhibition." Possibly in 1913 a similar exhibition might be arranged for the display of the fruit of the Commonwealth of Australia, of Tasmania, and of the Dominion of New Zealand.

In conclusion he had great pleasure in submitting the toast of our overseas visitors and coupling with the toast the name of Sir Albert Gould, late President of the Senate of the Commonwealth of Australia.

Sir ALBERT GOULD said it afforded him very great pleasure to have the opportunity of saying a few words in response to the toast proposed so ably by Sir Daniel Morris. To do justice to the toast would require far more time than he had at his disposal. He was pleased to hear the history of the R.H.S. detailed and to realize that it was not only one of the oldest Horticultural Societies in the British Empire but by far also the most important. He congratulated the Society upon the fact that for the last twenty years it had been increasingly prosperous after experiencing many years of difficulty and depression, and might now be regarded as at the zenith of its usefulness, affording as it did such excellent opportunities, from the many splendid exhibits brought together, for visitors to improve and to extend their horticultural knowledge. But the Society's efforts, he was pleased to know, were not confined to the holding of exhibitions such as the present, valuable as that was. It had also its educational and scientific side, and had done much to introduce and acclimatize many useful and beautiful plants from all quarters of the globe. Many of the visitors had come to England with the idea of having a good time, and they had had not only a good time but an exceedingly good time, and they appreciated most highly the courtesy, kindness, and generous hospitality extended to them on every hand since their arrival in this country. They had seen the magnificent ceremony of the Coronation, and, speaking on behalf of many of those who had come to this country from all quarters of this great Empire, which practically extended over the whole world, he thought that the Coronation ceremonies which they had all had an opportunity of witnessing made them

realize to the fullest extent the grandeur, the power, and the influence of that Empire. Those who come from the Dominions beyond the seas do not regard the British Empire as limited to the United Kingdom of Great Britain and Ireland; that is regarded as the heart of the Empire, while its arms and limbs spread themselves over the world. Those who come from the Dominions beyond the seas are as much Britons and as proud of the Empire as are they who live within its heart. In their veins runs the same blood, while their aspirations are the same. To those overseas has been allotted the task of subduing nature in their land, but they are also prepared to take their share in the defence and responsibilities of this great Empire. New Zealand had presented the Empire with a great battleship—a great gift from a country with so limited a population—and had agreed to an increased yearly contribution towards the maintenance of the Pacific Squadron. Australia, too, was doing her share and was creating a navy, not for the purpose of standing aloof from, but to assist in the defence of the Empire and the protection of its trade routes. Some had expressed the opinion that Australia could have done better by contributing large sums towards the upkeep of the Imperial Navy, but, be that as it might, Australia was increasing her large expenditure in following on what she regarded as the best and most effective method in the interest of the Empire. Many, Sir Albert went on to say, are paying their first visit to this country and many erroneous ideas as to its people have been cleared away; and that surely is well, for are we not kith and kin? Whether we live at the Antipodes or elsewhere, we are all Britons and proud to be members of the greatest Empire the world has known. Mr. Chairman and gentlemen, I thank you on behalf of the visitors from beyond the seas.

SIR THOMAS ELLIOTT, K.C.B., in proposing the toast of "The Royal Horticultural Society," said that the Society, under whose auspices the exhibition was held, had been fortunate in securing the services of capable and distinguished men who had made that Society what it was. The industry which the Society was established to promote was a rapidly increasing one, and afforded to many thousands of their fellow-countrymen not only a healthy pursuit, but sane, rational pleasure. He had always thought that the R.H.S. was an admirable example of what Englishmen could do without State aid and untrammelled by Government interference and restrictions. The series of exhibitions held under the auspices of the Society set up a standard to which some of them might try to attain, and they afforded to horticulturists opportunities for bringing new ideas to the knowledge of those who were interested. The way in which the Society had done their utmost to promote education, both scientific and technical, in all matters affecting horticulture was deserving of the highest possible praise; and it was a real pleasure to the Board of Agriculture to find themselves able to give them a grant this year for the first time in aid of their work. Some people seemed to think that Government offices kept tubs of sovereigns in their cellars into which they could dip for the purpose

of giving grants; but that, of course, was not the case, and the Board had had a great deal of trouble to obtain the money. The publications of the Society were of great advantage to all horticulturists. Last Friday he had the privilege of travelling from Cambridge with some of our Colonial visitors; and he did not fail to point out what could be seen from the train between Bishop's Stortford and London, the hundreds of acres of ground in cultivation under glass. Their visitors could thus obtain for themselves a rough view of what this country was horticulturally. He thought, on an occasion like this, of the men who had built up the Society, the Trevor Lawrences, the Daniel Morrisses, the Wilkses, the Veitches, and others who had made the Society what it was, and he expressed his admiration for them. So long as they were able to enlist the services of such men, and of men like Sir Albert Rollit, with whose name it was his privilege to couple the toast, there was every reason for confidence in the future of the Society. He gave the toast in the words of the old City Guilds: "Root and branch, may it live and flourish for ever."

SIR ALBERT ROLLIT, D.C.L., LL.D., said that when he accepted the compliment of responding to this toast he felt that he was really an understudy, and the difficulty was not lessened by the fact that the real study, the President, was present and ought really to have replied. But, after all, that gave him a better opportunity of appreciating to their guests the services of the President and Council of the Society. He was glad those services had evoked the approval of the permanent head of the Agricultural Department of State. They had done their best to co-operate with that Department, and he thought that in one respect they had been of some help, particularly on the subject of making rural education more suitable and practical, in which respect, he had, with Mr. Chittenden, represented the Council of the Society on the Rural Education Conference. It was pleasant to be praised by the permanent head of an Agricultural Department—especially as he had recently had a contrary experience. He was talking to the head of the Agricultural Department of the United States at Washington, who said: "With regard to inventive and intensive cultivation, I think you have not done what might have been expected from you. Now, we have devised a system by which we not only promote the growth of vegetables, but at the same time we turn an arid, desert plot of land into a fertile and fruitful area; and how we do it is this: we plant vigorous races of onions and potatoes in alternate rows, and the onions grow so strong that they draw tears from the eyes of the potatoes and so raise the level of saturation of the whole surrounding district." As an organization—and nearly everything that was successful was the result of organization; even religion was organised piety, philanthropy was organized benevolence, "party" was organized public opinion—the R.H.S. had done its best to treat horticulture not only as a science but as an art and a trade; and he did not hesitate to say that their success was largely due to the names of those mentioned by Sir Thomas, and especially to the presence of the practical gardening members on their

Council and Committees, which had enabled so much progress to be made. Their object had been, and was now, education, not merely academic but practical and progressive; and in those respects he thought very much had been achieved. He expressed his gratification at the presence of so many from our Overseas Dominions. The history of our Colonies was very diversified: first, they were called and treated as "plantations," which was at least horticultural; but they were exploited for the benefit of the Mother Country. That lost us much of the New World. Next some statesmen, so called, counted the cost of our Colonies, and even cried, with French doctrinaires, "*Périssent les Colonies plutôt qu'un principe*," a parsimony which was certainly not economic; but we had now arrived at the happy stage when we sought to make common bonds of commerce and trade, and to effect not only a union of hearts but a union of interests. In that respect he thought the R.H.S. had contributed a great deal by its Colonial Fruit Shows and otherwise. The other day he was struck by a remark he heard from Sir Wilfrid Laurier, that it did not much matter what we did or did not do at the Imperial Conferences, provided we maintained and developed them; and in that connexion he might say that at the London Chamber of Commerce they were now developing something equally important, namely, an Imperial Council of Commerce, in which the Dominions would be adequately represented, for Imperial trade. In this very Flower Show, in which he acted as one of the judges of fruit and vegetables, the Council had made an award in favour of an exhibit of fruit from New Zealand, of which he was very glad, because there was a great desire to do all they could to encourage the Colonies in such industries. The other day he read that a newly married couple wished to raise their own vegetables; and, in addition, they thought tomatoes would be both tasty and refreshing. So the wife planted tomatoes, and planted them as they came from a Colony in tins, and when the crop was expected and the husband asked about it she confessed that she had forgotten to open the tins before planting them. From that he gathered that the saying of British Columbians that "We eat what we can, and we can what we can't," was capable of some abuse. That was their first year at Olympia,—the Olympic Games had had similar contests, and the Greek awards were only a crown of laurel or a bunch of parsley; but the R.H.S. had gone further and had given a Coronation Challenge Cup and other most valuable prizes. He hoped that next year at the International Flower and Fruit Show, not merely our own and foreign nations would be represented, but that our great Colonies would take part in honourable rivalry, and help to maintain the British Empire and keep the R.H.S. at the head of the horticulture of the world. British industry, organized and aided by the Royal Horticultural Society, had already attained that position; and in the case of the Colonies they hoped to encourage and carry forward the great work of the cultivation of the earth and its fruits, and thus to leave a legacy of having done their best for the safety, honour, and

welfare of our King and country and of his great Dominions beyond the seas.

The Hon. J. H. TURNER then proposed the health of the Chairman, Sir Trevor Lawrence, Bart., President of the Royal Horticultural Society. He said:—

“ I feel that all the Colonies are very much indebted to the President of the Royal Horticultural Society and to the Society for what they have done to give the people of Great Britain a more correct knowledge of the overseas parts of the Empire, and I appreciate it the more from my thorough acquaintance with the conditions of the Province which I have the honour to represent in London.

“ When I came to England some ten years ago I found very little was known about British Columbia and very incorrect ideas existed about that Province. I have frequently, for instance, been asked what sort of furs and clothing were required there. Some people seemed to imagine it was a land of ice and snow, whilst some confused the Province with Colombia in South America, and imagined it to be a very hot country. Noticing this ignorance of the actual conditions, I decided that a practical way to inform the British public would be by an exhibition in England of the fruit grown in British Columbia, and I induced the Government of that Province to send some over for exhibition. I then saw your able Secretary and interested him in the matter, with the result that a small lot of this fruit was shown in 1903, and this was really the commencement of the Colonial Fruit Shows which have done so much to inform the British public with respect to the climate and the capabilities of British Columbia and other Colonies. These Shows culminated in a grand exhibition of some thirty tons of British Columbia apples last autumn. This was, I believe, the finest show of such fruit that had ever been held in Europe, and most effectually instructed the people here as to what could be produced in that beautiful Western Province of the Dominion.

“ I was much interested a few minutes ago by the speech in which reference was made to that great naturalist and wonderful man Douglas, the discoverer of the Douglas Pine. The reference to him appealed to me very much, as I have camped so often under the glorious pines of Vancouver Island and other parts of British Columbia, and only in 1907 I had a motor journey across Vancouver Island from the east to the west coast (and, by the way, when I left British Columbia seven years previously there was not a motor on that west coast). On this trip, after having passed over the side of a mountain some 2,000 feet in height, we ran down into a grand forest of Douglas Pines, most of them from 200 to 300 feet in height and without a branch for 100 feet up. Magnificent! Perfectly straight pillars meeting together at that height like the Gothic roof of a cathedral. Going out from the bright sunshine into the dim light and coolness gave me quite the impression of entering some magnificent sacred shrine, and there are many hundreds of thousands of acres of such forests in British Columbia.

“ It is very evident to me that the Royal Horticultural Society has

been doing a great work in bringing together the products of the various Colonies of the Empire and exhibiting them here in London. This has not only given British people a fair knowledge of the conditions in their great Empire, but has had the tendency to bring all the people together also, and I am sure that much instruction has been afforded by these exhibitions, and the whole Empire owes a debt of gratitude to the able President for the work that he has done in connexion with this important Society."

The PRESIDENT, in reply, after thanking the visitors for honouring the Society with their presence that day, said that with regard to what Mr. Turner had suggested about himself, it was quite a mistake to suppose that the prosperity of the Society had anything to do with individuals; it was due to their having at heart the spread of the love of horticulture throughout the length and breadth of the Empire, which of recent years has been almost phenomenal.

GENERAL MEETING.

JULY 18, 1911.

Dr. A. B. RENDLE, F.R.S., F.L.S., in the Chair.

Fellows elected (39).—H. Aveling, Lady Beaumont, W. Beer, Miss D. M. Ligg, Mrs. Borradaile, E. M. Bovill, Lady Butler, Mrs. W. W. Clements, Rev. A. F. Curtis, M.A., Miss Denipsey, J. H. Downey, G. H. Dudman, Mrs. Durnford, F. D. Eades, Mrs. R. Fletcher, Miss J. A. Glover, Mrs. C. Grabham, Mrs. B. Hannen, Rev. J. Hunter, M.A., Mrs. F. Lucas, D. R. Marshall, Mrs. Maynard, Lord Montagu of Beaulieu, Mrs. Patterson, W. E. Paull, Captain A. H. Royds, Mrs. C. P. Scudamore, J. Shelmerdine, Mrs. E. M. Slade, J. Smith, M. Spicer, R. G. W. Sprules, J. P. Stone, A.C.P., S. J. Toms, Mrs. P. Vaughan-Morgan, J. Walker, C. J. Weir, Mrs. F. H. Weldon, Mrs. G. Wyndham.

Fellows resident abroad (2).—A. G. R. Prickard (Transvaal), E. H. Wilson (Mass., U.S.A.).

A lecture on "Iris" was given by Mr. W. Rickatson Dykes, M.A.

DEPUTATION TO THE NORTH OF ENGLAND HORTICULTURAL SOCIETY'S SHOW AT HARROGATE.

AUGUST 15, 1911.

A DEPUTATION, consisting of Sir Albert Rollit, D.L., LL.D., Litt. D., and Messrs. E. A. Bowles, M.A., G. Bunyard, V.M.H., J. Hudson, V.M.H., and H. B. May, V.M.H., attended the Harrogate Show of the North of England Horticultural Society held on August 15th, 1911. It was the first show of the Northern Society under canvas, and it

attracted some good exhibits of flowers, plants, and fruits, covering 4,000 square feet of tabling. After the deputation had made their awards they took luncheon as the guests of the Harrogate Agricultural Society, whose annual show was being held in a field adjoining the Flower Show. Lady Kathleen Pilkington presented cups to the winners, and the awards made by the deputation on behalf of the Royal Horticultural Society were announced. Sir Albert Rollit responded to the vote of thanks to the Royal Horticultural Society proposed by Major Dent, the Chairman of the Northern Society. In the evening Lord Faber paid the Society the compliment of entertaining the deputation to dinner at his private residence "Belvedere," Captain Faber, and the Rev. Bernard Hall, R.N., Secretary of the North of England Society, being also present. The generous hospitality and kind reception extended by his lordship will long remain a happy memory. The only disappointment of the visit was the inability to accept Major Dent's invitation to see his gardens and famous apple tree at Ribston Hall, Weatherly, on the following day. To Lord Faber, Major Dent, the Rev. Bernard Hall and the Harrogate Agricultural Society, the President and Council of the Royal Horticultural Society extend their hearty thanks for the kind reception given to the deputation. The Council further wish to express their goodwill to the new North of England Society, and their hope that this visit will give some little additional impetus to the tide of its success.

The following are the awards made by the deputation:—

Silver Cup.

Messrs. Harkness, Bedale, for Gladioli and herbaceous plants.

Messrs. Artindale, Sheffield, for herbaceous flowers, rock-garden, and other plants.

Messrs. Batchelor, Harrogate, for ferns, herbaceous plants and tomatos.

Silver-gilt Flora Medal.

Messrs. Charlesworth, Haywards Heath, for Orchids.

Messrs. May, Edmonton, for ferns.

Silver-gilt Banksian Medal.

Messrs. Mansell & Hatcher, Rawdon, for Orchids.

Messrs. Gibson, Leeming Bar, for herbaceous flowers.

Messrs. Dobbie, Edinburgh, for Roses, Gladioli, &c.

Messrs. Backhouse, York, for apples and herbaceous flowers.

Messrs. Kelway, Langport, for Gladioli.

Silver Hogg Medal.

J. Brennand, Esq., Baldershy Park (gardener, Mr. Hathaway), for fruit and vegetables.

Silver Knightian Medal.

W. D. Cliffe, Esq., Leeds (gardener, Mr. Hague), for fruit.

Silver Flora Medal.

Messrs. E. V. Low, Haywards Heath, for Orchids.

Mr. W. Lawrenson, Yarm-on-Tees, for Carnations and Phloxes.

Mr. C. F. Waters, Balcombe, for Carnations.

Messrs. Ker, Liverpool, for stove and greenhouse plants.

Mr. F. J. Bell, Whitley Bay, for Sweet Peas and Violas.

Messrs. Brown, Peterborough, for Roses.

Silver Banksian Medal.

Mr. S. Bailey, Knaresborough, for Sweet Peas.

Messrs. Young, Cheltenham, for Carnations.

Messrs. Conway, Halifax, for hardy flowers.

Messrs. Mack and Miln, Darlington, for Roses and herbaceous plants.

Mr. Alva J. Hall, Harrogate, for Coleus, Fuchsias, &c.

Messrs. Mawson, Windermere, for herbaceous plants.

Bronze Flora Medal.

Messrs. Keeling, Bradford, for Orchids.

Messrs. Dickson and Robinson, Manchester, for Phloxes.

Mr. A. H. Rigg, Baildon, for Roses.

Mr. W. Bonsall, Harrogate, for Carnations and greenhouse plants.

Bronze Banksian Medal.

Messrs. Jarman, Ripon, for Sweet Peas and Dahlias.

Cultural Commendation.

W. S. Hannam, Esq., Burley in Wharfedale (gardener, Mr. Booker), for Peaches.

Certificate of Appreciation.

The British Botanical Association, York, for educational work.

SPECIAL CHALLENGE CUP FOR FRUIT AND VEGETABLES, OFFERED BY
LORD FABER, AND ADJUDICATED BY THE DEPUTATION.

J. Brennand, Esq., Baldersby Park (gardener, Mr. Hathaway).

GENERAL MEETING.

AUGUST 29, 1911.

Sir TREVOR LAWRENCE, Bart.; K.C.V.O., V.M.H., in the Chair.

Fellows elected (71).—B. G. Abel, H. Adams, G. H. Allsop, H. A. Andreae, A. Appleton, Mrs. E. H. Barran, J. Baxter, F. C. Beech, J. A. Bell, W. D. Bosanquet, F. C. Bosworth, Lady Brabourne, G. Bridges, W. C. Briggs, J. W. Brockbank, A. Brookes, A. F. Burgess, W. Buttery, Mrs. Cammell, A. D. P. Campbell, R. Campbell, Mrs. Carter, Captain H. A. Clifton, Miss H. M. Crosland,

F. Davies, H. B. Davies, F. W. Dawes, W. Dell, S. W. G. Dennis, D. Earp, G. L. Eastes, C. W. Elsley, S. R. Forsey, J. H. Gooding, Mrs. Greaves, B. E. Greenwell, O. Griffith, A. C. P. Handover, C. H. Hawke, B. M. Haynes, L. H. B. Hobday, J. H. Hughes, H. C. Hutchinson, Lady Otto Jaffé, J. C. Jenner, D. Jones, J. Keates, Mrs. A. Ladenburg, Mrs. E. B. Lees, Lieut.-Colonel S. F. Loughheed, C.M.G., E. Manwaring, J. H. Marshall, J. May, R. W. Mills, E. S. Neal, Miss W. Osborne, E. Pickford, J. J. Porter, Mrs. Preston-Joy, Rev. A. B. Purchas, J. G. Robson, P. R. H. Rudge, A.C.P., O. A. Sargent, F. Sills, A.R.I.B.A., H. Courtenay Sim, H. Swallow, O. Thompson, F. C. Tiarks, Captain C. I. Ward-Jackson, J.P., G. H. Webster, C. Yates.

Fellows resident abroad (3).—R. Aitken (Canada), G. W. A. Gordon (Malay States), Captain C. K. C. Stuart (Burma).

SCIENTIFIC COMMITTEE.

MAY 9, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and thirteen members present.

Gongora Tracyana.—This plant, shown at the meeting on April 26 by Messrs. Tracy and referred to Kew, proved to be an undescribed species, to which the name of *G. Tracyana* Rolfe has been given. It was unanimously resolved to recommend the award of a Botanical Certificate on the ground of its novelty.

Oncoba Routledgei.—The plant recommended for a Botanical Certificate under the name of *Oncoba spinosa* var. *Routledgei* at the meeting on April 26 had been further examined at Kew, and it has now been made a separate species and named *O. Routledgei*. (Fig. 70.)

Malformed Odontoglossum.—A spike of a form of *Odontoglossum crispum* from Sir Julius Wernher, of Luton Hoo, bearing several malformed flowers, as well as others of a normal character, was referred to Mr. Worsdell, who reported as follows:—"The balance of the spike is quite upset. Most of the flowers are normal, however. The peculiar structure present is due to a compromise between two tendencies (1) that making for reduction or fusion, and (2) that making for multiplication of parts. There is no evidence at all for actual synanthly or for the 'passing of one part of a flower into the next,' as the spatial distribution of the flowers on the spike appears to be normal. On the other hand, there is an equal absence of evidence that an increase in the number of flowers on the spike is occurring. In one flower there is a remarkable case of 'positive *dédoublement*'; four sepals, uppermost (posterior) forked; four ordinary petals (which might have resulted from forking of the lateral ones); one of these four lies exactly in the median plane (anterior); two labella forming with the column a whorl of three within the four ordinary petals; the column is double below, but triple above (there being three anthers). One anther is becoming petaloid. Owing to the causes above mentioned the flower comes to have a larger number of members than usual; and the composition of the whorls is altered, owing to the fact that, under the circumstances, the members must be more or less rearranged, so as to obey the law of alternations. In the second flower there are three normal sepals, but the anterior one is in structure and appearance intermediate between a sepal and a petal, as it has the brown blotches of the former; but it is lighter in colour than the sepals and has a slight tendency to be fringed at the margin like a petal; there is no present evidence as to its origin, but it perhaps arose by division of the normal sepals, two labella forming with the double column a whorl of three. In the third flower the reductive or fusion

tendency has overpowered the other (or multiplicative). The two lateral sepals have fused into a single one in the anterior median plane, but this sepal is triple, and the middle lobe may represent the third sepal-like petal of the second flower referred to, and this is very likely: in which case it would not be accurate to speak of fusion of two sepals. There are two labella, one of which is much smaller than the other and has its stalk completely fused with the column. The column is double, but the anthers are much more closely approximated than in the last two flowers (an interesting fact as showing the fusing process). The sepals are more petal-like and larger than usual, as is natural. In the fourth flower the reduction and fusion tendency is all-potent; the flower is 2-merous. It has two sepals (anterio-posterior), the anterior one being very large, owing to fusion of the two normal lateral ones; two lateral petals larger than normal, doubtless correlated with the complete absence of the labellum. The absence of the latter must be attributed either to abortion or to congenital and intimate fusion with the column (an analogy for such a fusion exists in the third flower, and the column has its lateral petaloid appendages larger than usual). The ovary appears to be normal. A very interesting fact is that the bracts subtending two or three of the flowers showing positive *dédoublément* are double, having two tips and two midribs. In such cases the splitting tendency is very powerful, and if it went further would result in the formation of two flowers side by side; these then might become spatially separated in a vertical direction on the axis of the spike.

The structure of the dimerous flower has probably, from a morphological point of view, nothing whatever to do with the malformations, but, physiologically, there may be a connexion. Exigencies of nutrition may demand that, if some flowers have an extra number of organs to be fed, other flowers must not be supplied with so many organs, economy in the spike-household being thus maintained."

Fasciated Asparagus.—Canon Fowler showed a fasciated and contorted stem of *Asparagus*, about $1\frac{1}{2}$ inch in diameter.

Tulip Disease.—Canon Fowler also showed specimens of Tulips with numerous brown blotches upon their leaves. This disease appears to be caused by the *Botrytis* form of a species of *Sclerotinia*. When the attack is a bad one, the fungus forms black sclerotia near and about the top of the bulbs, between them and in the soil, and by these the disease is continued into the next year. The spread of the disease may be checked by spraying with potassium sulphide, but it is well to completely remove and destroy badly-diseased plants, to plant in fresh soil, and to discard any bulbs showing traces of the sclerotia (which vary in size from a pin's head to a pea) when planting is done in the autumn.

Twin-flowered Daffodils.—Mr. Shea showed several varieties of *Narcissus* having two flowers in place of the normal one, and a specimen was sent from Darlington of a form of *N. poeticus* with three flowers. Several members remarked upon the common appearance of this phenomenon this season.

New Plants.—Messrs. Veitch showed specimens of *Viburnum Davidii*, an evergreen *Viburnum* with large, glossy leaves and corymbs of small, whitish flowers, and *Rhododendron concinnum* and *R. rufescens*, the latter a dwarf species, about 6 inches in height, with white flowers about $\frac{1}{2}$ inch in diameter, and having somewhat the habit of *R. intricatum*.

Hymenocallis \times *festalis*.—Mr. Worsley showed spikes of this hybrid raised by him between *Ismene calathina* ♂ and *Elisena longipetala*. The hybrid is remarkably vigorous in habit.

SCIENTIFIC COMMITTEE, JUNE 6, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and ten members present.

Rosa hemisphaerica.—The Rev. Canon Ellacombe sent flowers of the sweetly-scented *Rosa hemisphaerica* from a plant growing on a wall in his garden. This yellow rose, which is very rare in gardens, is said to flower only in very dry seasons.

Iris discoides.—A rhizome of *Iris pumila* attacked by "rhizome rot" was received. This disease is due to a bacillus, and is very difficult to cure. The parts of the rhizome affected should be removed and burnt as soon as the disease appears.

SCIENTIFIC COMMITTEE, JUNE 20, 1911.

Mr. J. T. BENNETT-POE, M.A., V.M.H., in the Chair, and nine members present.

Catasetum 'Cliftonii'.—Mr. O'Brien, V.M.H., showed plants under this name from the collections of Sir Trevor Lawrence, Bart., and Sir Jeremiah Coleman, Bart., respectively. The flowers presented several minor points of difference in coloration and in the form of the lip, but both had a large callus upon the latter. No essential difference was to be seen in habit. Mr. O'Brien considered them to be forms of one species, a view with which Dr. Rendle, to whom they were referred, concurred. Dr. Rendle regarded them as forms of the very variable *Catasetum Bungeorhizii*, a Venezuelan species figured in *Bot. Mag.*, tab. 6,998.

Malformed Cattleya.—Mr. O'Brien also showed a malformed *Cattleya labiata*, upon which Dr. Rendle commented as follows: "The dorsal sepal has become broad and short, resembling more the lip and petals; the lateral petals have become shorter, resembling the lip in colour, but slightly smaller; they are enclosed by the lip and convolute with each other; the dorsal sepal, with lip and petals, formed a central rosette; the lateral petals are shorter than usual, but otherwise normal. The column is reduced, forming a pillar-like structure bearing an aborted anther."

SCIENTIFIC COMMITTEE, JULY 18, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and fourteen members present.

Botanical Certificates.—*Catasetum reflexum*, a new species, from Peru, approaching *Cynoches* in some of its characters, was sent from Glasnevin by Sir Frederick Moore. On the motion of Mr. O'Brien, V.M.H., seconded by Mr. Wilson, F.L.S., a Botanical Certificate was unanimously recommended to this plant. A new *Dendrobium*, from Java, was exhibited by Sir Trevor Lawrence, Bart. It had been described under the name of *D. Annae*, J. J. Smith, and is nearly allied to *D. mutabile* (which was shown to compare with it), but about double the size. On the motion of Mr. O'Brien, V.M.H., seconded by Mr. Bennett-Poë, V.M.H., a Botanical Certificate was recommended.

Scale on grass.—Mr. Holmes, F.L.S., showed a white scale insect attacking grass from Charing. This scale (*Uropeltis festucae*) appears to be common this season in places, and proves destructive to the grasses it attacks, causing them to become brown.

Sweet Pea roots.—Mr. Holmes also showed dying roots of Sweet Pea. These, as is so frequently the case this year, were attacked by the fungus *Thielavia basicola*. The foliage of attacked plants turns yellow in patches, and finally dies, while the stem is often streaked with yellowish-brown. The fungus also attacks the culinary Pea, and produces similar symptoms. In America and Italy it has proved extremely destructive to Tobacco, and nothing short of sterilization of the soil has served to effectively check its ravages.

Papaver orientale with cleistogamous flowers.—Mr. Fraser, F.L.S., showed *Papaver orientale* with cleistogamous flowers. The plants had produced similar flowers last year. The petals were linear-oblong, not imbricate, and only as long as the sepals. The pollen was abundant, and both stamens and pistil appeared normal.

Sport in Shirley Poppy.—Mr. Fraser also showed flowers of Shirley Poppy having the usual yellow stamens, but with two of the petals red and the two alternate ones white.

Matricaria suaveolens.—Mr. Bowles showed specimens of *Matricaria suaveolens* (= *M. discoidea*), an introduced plant which now grows wild in many English counties, and as far north as Aberdeen. The specimens were collected in the neighbourhood of Epping.

Crown-gall.—Mr. H. T. Güssow sent specimens of crown-gall—large swellings on the roots or near the collar of trees. These came from Canada where the disease, as in the States, appears to be common on a variety of plants. It has been shown by Dr. Erwin Smith to be due to the attack of *Bacillus tumefaciens*, though others, apparently without recourse to inoculation experiments, have ascribed it to the attack of a Myxomycete. Numerous plants of widely distinct families are attacked by the bacillus, but it does not yet seem to be clearly established that is very harmful to the plant attacked.

Fasciated Rose.—Mr. Basham, of Bassaleg, sent a fasciated Rose

stem over 1 inch in diameter, and bearing at its apex nine more or less developed buds.

SCIENTIFIC COMMITTEE, AUGUST 1, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and eight members present.

Uncommon Orchids.—Mr. O'Brien, V.M.H., drew attention to two uncommon Orchids shown by Sir Trevor Lawrence—*Catasetum apterum*, which he regarded as nearly related to *C. splendens*, several varieties of which had been described, and *Eria mysorensis*, bearing pretty, small flowers, with a curious and rather unpleasant scent.

Antirrhinum, &c., *malformed*.—Mr. Fraser, F.L.S., showed a flower of *Antirrhinum majus*, with the petals separated nearly to their bases, and therefore almost free. The flowers below it in the inflorescence were of normal structure. Two plants showed the peculiarity, but seed did not appear to be formed freely. He also showed Gloxinia flowers having petaloid outgrowths from near the base of the corolla, on its outer side, similar to those previously exhibited by Mr. Odell of *Gloxinia* and *Streptocarpus*, and which Mr. Odell had found in the former plant to be produced regularly every year (see JOURNAL R.H.S., vol. xxxiv., p. cxii., and vol. xxxv., p. cxviii.).

Aconitum rostratum.—Canon Ellacombe sent a fasciated branch of this rare, white-flowered Aconitum.

Cucumber with persistent flower.—Dr. G. Waller, of Wimbledon, exhibited fruits of Cucumber, having the flower green, and persisting even when the fruit was fully grown. This is not a very uncommon occurrence in fruits of this family, but Dr. Waller's plants showed it in a marked degree.

Sweet Pea with supernumerary carpels.—Mr. Cuthbertson mentioned the occurrence in the garden of E. H. Christy, Esq., of Margaretting, of Sweet Peas, having three pods produced from every flower on a plant in the variety 'Mrs. Hugh Dickson.' The flowers appeared to be otherwise normal, but every flower on the plant produced three carpels, which had been noticed by Mr. A. Ireland when examining Mr. Christy's collection.

SCIENTIFIC COMMITTEE, AUGUST 29, 1911.

Mr. W. BOTTING HEMSLEY, F.R.S., F.L.S., V.M.H., in the Chair, and six members present.

Wheatear Carnation.—Mr. F. J. Chittenden sent an example of the well-known "wheatear" Carnation, which differed from the usual form, in having not only the continued repetition of the bracts, but above these, of the calyx. The first few whorls had the bracts arranged opposite to one another as usual; above these were some not so regularly arranged and occasionally connate below, while above, the leaves were in whorls of five and connate as the calyx is usually.

Narcissus fly in Habranthus.—Mr. Chittenden also sent some bulbs of *Habranthus pratensis* received from Norwich, attacked by the grubs of the Narcissus fly, *Merodon equestris*. This insect appears to be extending its feeding habits to several other bulbs besides the Narcissus.

Oak galls.—Mr. Hales showed specimens of the common Oak attacked by the Artichoke gall (*Aphilotrix fecundatrix*), the Oyster gall (*Neuroterus ostreus*), and the Spangle gall (*Neuroterus numismatis*). Mr. Odell also showed shoots of *Quercus coccinea*, *Q. Cerris*, and *Q. Robur*, collected from trees growing near together, but whilst the two former species were healthy and green, the common Oak was badly galled with *Neuroterus ostreus* (Oyster gall), and the leaves were starved and browned.

Mints.—Mr. Fraser, F.J.S., called attention to the many Mints in general use for culinary purposes, and submitted several specimens of different forms. *Mentha spicata* is the Mint for sauce as generally sold in the markets, whilst *M. longifolia* is the one generally found in private gardens. He had tested the various forms, and concluded that *M. spicata* was the best flavoured. Mr. Odell said that he considered *M. candicans* the best.

Solanum nigrum.—Messrs. J. Veitch showed a well-grown and fruited specimen of the Canadian Huckleberry.

British Orchid hybrid.—Mr. Botting Hemsley showed a figure of a British Orchid found on Reigate Hill in the third week of April last. It had three spurs, no pollen, and many other abnormalities. It was somewhat like *Habenaria viridis*, but the labellum rather more resembled that of an Orchis. It was apparently a hybrid, and too abnormal to connect with any British species, whilst its early flowering appeared unaccountable.

Adioda × '*St. Fuscien*' (*Ada aurantiaca* × *Cochlioda Noezliana*). Mr. O'Brien called attention to this singular hybrid raised and shown by Monsieur Henri Graire, Amiens. He stated that although it would be known as a bi-generic hybrid the affinity of both parents was nearer than it appeared to be on casual examination. *Cochlioda* was founded by Lindley on Matthews' type *Cochlioda densiflora* in 1838, but not published until 1853. Meantime the same author (1844) had named the plant now known as *Cochlioda rosea*, *Adontoglossum roseum*. Later Reichenbach included both *Ada aurantiaca* and *Cochlioda rosea* under *Mesospinidium*, a genus known to be distinct from *Cochlioda*, and of which but few examples are at present in gardens. The plant shown had a striking resemblance to *Cochlioda rosea*, the six-inch-long inflorescence bearing eight or nine flowers, each under an inch across. Sepals and petals linear lanceolate, bright red, the petals the broader. Lip three-lobed, reflexed at the tip yellowish tinged with dull red. The plant showed but little evidence of *Ada aurantiaca*.

FRUIT AND VEGETABLE COMMITTEE.

MAY 9, 1911.

Mr. G. BUNYARD, V.M.H., in the Chair, and nineteen members present.

Awards Recommended:—

Silver Knightian Medal.

To Messrs. Veitch, Chelsea, for vegetables.

Silver Banksian Medal.

To Messrs. Sutton, Reading, for salads.

Bronze Knightian Medal.

To Lord Curzon of Kedleston (gr. Mr. West), Basingstoke, for Strawberries.

Award of Merit.

To Asparagus 'Early Giant French' (votes, unanimous), from Messrs. J. Veitch, Chelsea.

To Asparagus 'Green Canadian' (votes, unanimous), from Messrs. Barr, Covent Garden.

To Cabbage 'Harbinger' (votes, unanimous), from Messrs. Sutton, Reading.

To Kale 'True Labrador' (votes, unanimous), from Messrs. Laxton, Bedford.

For descriptions of these plants see reports of Wisley Trials (pp. 398, 425).

Other Exhibits.

Mrs. Newington, Ticehurst: Apples 'Annie Elizabeth' and 'Bramley's Seedling.'

FRUIT AND VEGETABLE COMMITTEE, JUNE 6, 1911.

Mr. C. G. A. Nix in the Chair, and nine members present.

Awards Recommended:—

Bronze Banksian Medal.

To Miss Dixon, Aldingbourne, for Melons.

To Misses Le Lacheur and Sherries, Henfield, for Melons.

Other Exhibits.

Messrs. S. Low, Bush Hill Park: Figs.

Mr. S. Mortimer, Farnham: Cucumbers.

FRUIT AND VEGETABLE COMMITTEE, JUNE 15, 1911.

SUB-COMMITTEE AT WISLEY.

MR. J. WILLARD in the Chair, and six members present.

The following recommendations were made for the consideration of the full Committee at their next meeting:—

Award of Merit.

To Cucumber No. 32 ('Pride of the Market').

To Cucumber No. 47 ('Telegraph Improved').

Highly Commended (XXX).

Cucumber No. 40 ('Royal Osborne').

Pea No. 2 ('Abundance').

Pea No. 43 ('Empress of India').

Pea No. 51 ('Giant Lightning').

Pea No. 91 ('May Queen').

Pea No. 100 ('Pioneer').

Pea No. 112 ('Ready Reckoner').

Pea No. 159 ('World's Record').

Commended (XX).

Cucumber No. 5 ('Cardiff Castle').

Cucumber No. 37 ('Reliance').

FRUIT AND VEGETABLE COMMITTEE, JUNE 20, 1911.

MR. G. BUNYARD, V.M.H., in the Chair, and sixteen members present.

Awards Recommended:—

Gold Medal.

To Messrs. J. Veitch, Chelsea, for vegetables.

Silver Banksian Medal.

To Mr. S. Mortimer, Farnham, for Cucumbers.

Bronze Banksian Medal.

To Mr. A. G. Harwood, Colchester, for Asparagus.

Award of Merit.

To Cucumber 'Pride of the Market' (votes, unanimous), from Messrs. Barr, Covent Garden. A medium-sized cucumber of the Rochford type; 14 inches long; ribbed, and having rather a long neck and black spines. A very prolific bearer.

To Cucumber 'Telegraph Improved' (votes, unanimous), from Messrs. Carter, Raynes Park. A good cucumber of the Telegraph type, 15 in. long, slightly ridged, dark green, practically spineless; neck, short; a good cropper.

* See footnote, p. 399.

To Strawberry 'Excelsior' (votes, unanimous), from Mr. T. E. Smiles, Wilmington, Kent. Fruit of medium size, oval to wedge-shaped, bright red in colour, with red and rather depressed seeds; flesh pale pink, firm, very juicy and of excellent flavour. Plant robust, free-bearing, with large broad foliage. (Fig. 109.)

Highly commended (XXX).

The following varieties of peas from the trials at Wisley were highly commended. For descriptions, see Report of trials, p. 403.

*2. Pea 'Abundance,' from Messrs. Sutton, Reading.

35. Pea 'Early Morn,'† from Messrs. Carter, Raynes Park.

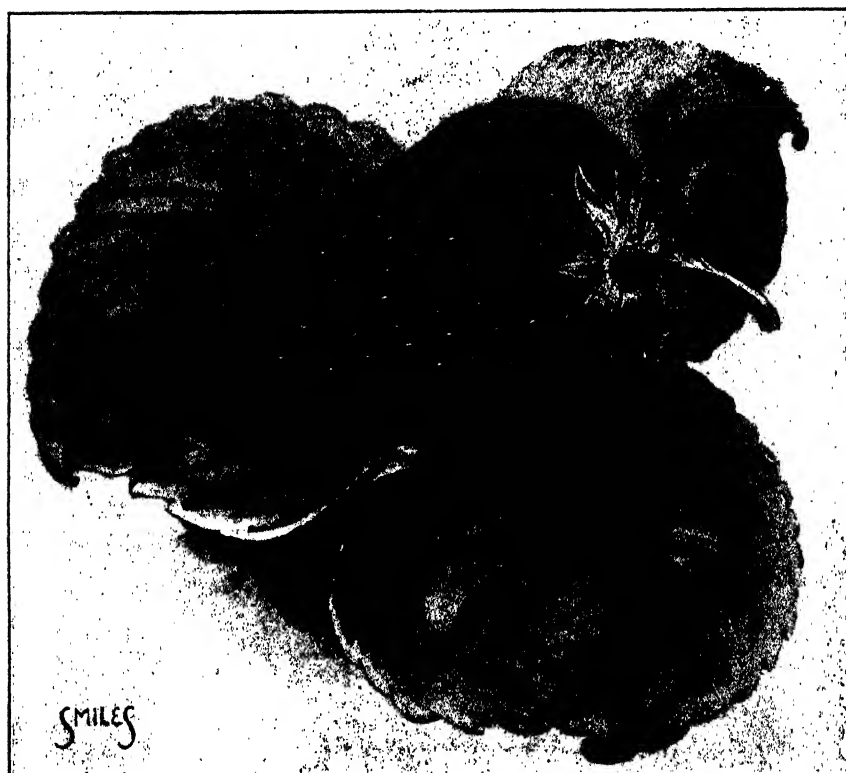


FIG. 109.—STRAWBERRY 'EXCELSIOR.'

- 43. Pea 'Empress of India,' from Messrs. Sutton, Reading.
- 51. Pea 'Giant Lightning,' from Messrs. Carter, Raynes Park.
- 91. Pea 'May Queen,' from Messrs. Sutton, Reading.
- 100. Pea 'Pioneer,' from Messrs. Sutton, Reading.
- 112. Pea 'Ready Reckoner,' from Mr. Holmes, Tain.
- 159. Pea 'World's Record,' from Messrs. Sutton, Reading.

* See footnote, p. 399.

† A.M. April 18, 1899, as a forcing variety.

Cultural Commendation.

To Messrs. Whitelegg & Page, Chislehurst, for the 'Phenomenal Berry.'

FRUIT AND VEGETABLE COMMITTEE, JULY 4, 1911.

AT OLYMPIA.

MR. G. BUNYARD, V.M.H., in the Chair, and twenty members present.

[For awards of cups and medals made by the Council after consultation with the Judges, see p. xciv.]

Awards Recommended:—

Award of Merit.

To Strawberry 'Peters' Olympia' (votes, unanimous), from H. P. Sturgis, Esq. (gr. Mr. W. Peters), Leatherhead. This is said to be the result of a cross between 'Givon's Late Prolific' and 'St. Antoine de Padoue.' Fruits of medium size, conical, bright scarlet with yellow pips. The flavour is excellent and the flesh juicy.

Other Exhibits.

A. B. H. Goldschmidt, Esq., Mildenhall: seedling Strawberry.
Messrs. Whitelegg & Page, Chislehurst: New Berry.

FRUIT AND VEGETABLE COMMITTEE, JULY 17, 1911.

SUB-COMMITTEE AT WISLEY.

MR. G. BUNYARD, V.M.H., in the Chair, and four members present.

The following Peas were selected from the trials for consideration by the full Committee at their next meeting:—

- *5. 'America' (Holmes).
- 30. 'Duke of Albany' (Sutton). **A.M.** July 5, 1901.
- 41. 'Exhibition' (Sutton). **A.M.** August 16, 1910.
- 46. 'Eureka' (Sutton).
- 70. 'King Edward' (Sutton).
- 87. 'Magnum Bonum' (Sutton). **A.M.** August 16, 1910.
- 88. 'Masterpiece' (Sutton).
- 89. 'Matchless Marrowfat' (Sutton).
- 97. 'Peerless Marrowfat' (Sutton). **F.C.C.** July 14, 1903.
- 98. 'Perfection Marrowfat' (Sutton). **A.M.** July 14, 1897.
- 110. 'Quite Content' (Carter). **F.C.C.** August 14, 1906.
- 111. 'Quite Content' (Barr). **F.C.C.** August 14, 1906.
- 131. 'Seedling No. 48' (Bell & Bieberstedt).
- 136. 'The Caithness' (Holmes).
- 139. 'The Cottager' (Yates).

The following Potatoes were also selected:—

1. 'Arduthie Early' (Smith).
14. 'Irish King' (Barr).
16. 'May Queen' (Barr). **A.M.** August 15, 1905.
23. 'Hale's Early' (Lloyd).
31. 'Windsor Castle' (Barr). **F.C.C.** September 12, 1893.

FRUIT AND VEGETABLE COMMITTEE, JULY 18, 1911.

Mr. G. BUNYARD, V.M.H., in the Chair, and fifteen members present.

Awards Recommended:—

Silver-gilt Knightian Medal.

To Rt. Hon. Lord Llangattock, (gr. Mr. T. Coomber), Monmouth, 'Queen' Pineapples.

To Messrs. J. Veitch, Chelsea, for Gooseberries.

Silver Knightian Medal.

To the Horticultural College, Swanley, (Principal Miss Wilkinson), for Melons.

Award of Merit.

To King's Acre Berry (votes, unanimous), from King's Acre Nurseries, Hereford. A long black berry with large pips and an excellent flavour. The fruit readily parts from the core and is very juicy. The habit of the plant is not so rampant as that of the Loganberry. It is very sturdy and bears heavy crops of fruit which are delicious in tarts. This fruit was discovered by Mr. J. Ward of Shobdon, Herefordshire, in the village of Shobdon and he passed on the stock to the King's Acre Nursery Company.

To Pea 'America,' from Mr. W. G. Holmes, Tain.

To Pea 'Eureka,' from Messrs. Sutton, Reading.

To Pea 'King Edward,' from Messrs. Sutton, Reading.

To Pea 'Matchless Marrowfat,' from Messrs. Sutton, Reading.

To Pea 'Bell's Premier,' from Messrs. Bell and Bieberstedt, Leith.

To Pea 'The Caithness,' from Mr. W. G. Holmes, Tain.

To Pea 'The Cottager,' from Mr. S. Yates, Manchester.

The above seven peas had been grown at Wisley and were sent up on the recommendation of a sub-committee who inspected the trials on July 17. Descriptions will be found in the Report of the Wisley trials (p. 403).

Other Exhibits.

Messrs. Barr, Covent Garden: Potato 'Irish King.'

Messrs. Bunyard, Maidstone: Cherries.

Mr. G. Ferguson, Kendal: Melon 'Sedgwick Gem.'

Mr. S. Lloyd, Droitwich: Potato 'Hale's Early.'

Messrs. Low, Bush Hill Park: fruit.

Messrs. Smith, Aberdeen: Potato 'Arduthie Early.'

FRUIT AND VEGETABLE COMMITTEE, AUGUST 1, 1911.

Mr. A. H. PEARSON in the Chair, and eleven members present.

Awards Recommended :—

Award of Merit.

To Potato 'Arduthie Early' (votes, unanimous), from Messrs. Smith, Aberdeen. This variety had been grown in the trial at Wisley. For description see Report on Potatoes at Wisley.

Cultural Commendation.

To Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree, for Tomato 'Golden Glow.'

Other Exhibits.

Messrs. Laxton, Bedford: The Laxton Berry and Plum 'Bedford Prolific.'

Messrs. Low, Bush Hill Park: New Berry 'Himalayan Giant.'

Dr. Geo. Walker, Wimbledon: Walker Berry.

FRUIT AND VEGETABLE COMMITTEE, AUGUST 15, 1911.

Mr. J. CHEAL in the Chair, and eight members present.

No awards were recommended on this occasion.

Exhibits.

Messrs. Barr, Covent Garden: Melon 'Mauldsle Castle.' **A.M.**
September 13, 1910.

Mr. T. Hancock, Mansfield: Tomato 'Hancock's Early Crimson.'

Mr. A. Mitchelson, Womersley: Tomato 'Coronation.'

Mr. E. J. Platten, Lowestoft: Tomato 'Smart's Finality.'

The three Tomatoes mentioned above had been grown at Wisley.

FRUIT COMMITTEE, AUGUST 29, 1911.

Mr. G. BUNYARD, V.M.H., in the Chair, and thirteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. Veitch, Chelsea, for fruit trees in pots.

Silver-gilt Knightian Medal.

To Messrs. Cannell, Swanley, for fruit.

Silver-gilt Banksian Medal.

To Messrs. Dobbie, Edinburgh, for Potatoes.

Silver Knightian Medal.

To Messrs. Spooner, Hounslow, for Apples.

Silver Banksian Medal.

To Messrs. Carter Page, London Wall, for Tomatos.

Award of Merit.

To Plum 'Blackbird' (votes, unanimous), from Messrs. Laxton, Bedford. A new plum of medium size, oval in shape and dark

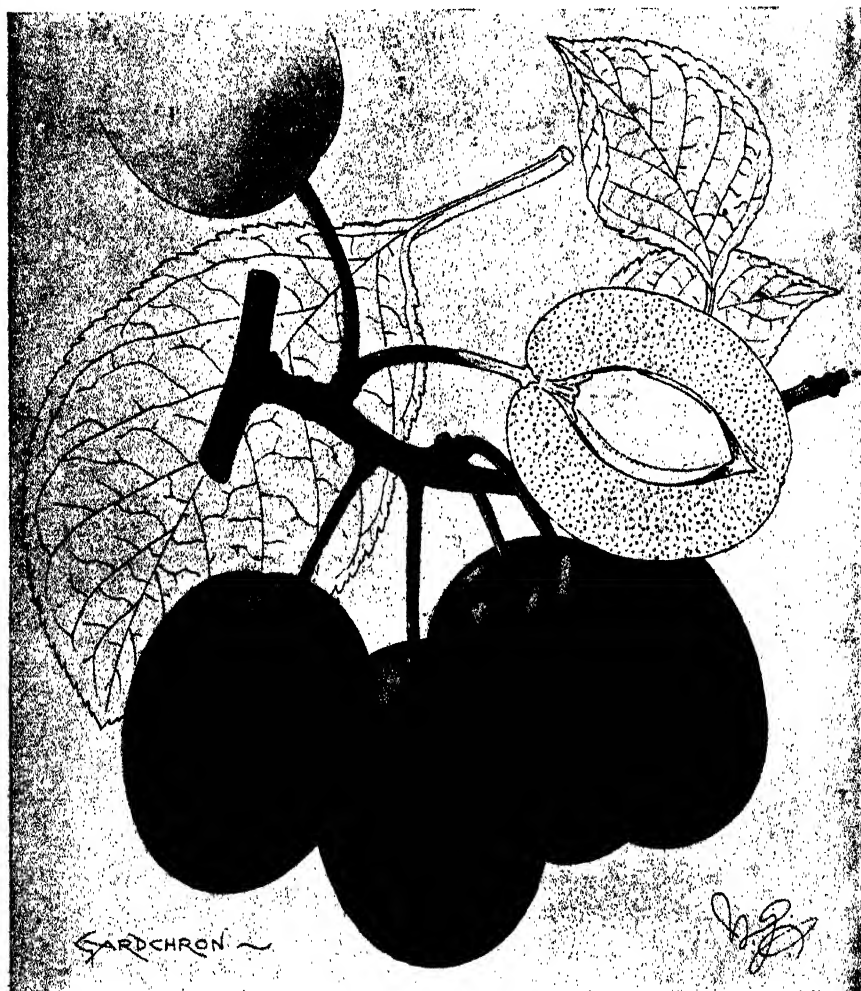


FIG. 110.—PLUM 'BLACKBIRD.' (*Gardeners' Chronicle.*)

blue in colour, with a deep bloom. The flesh is yellow and juicy. The fruit is good for cooking or dessert, and is the result of a cross between 'Czar' and 'Curlew' (fig. 110).

Other Exhibits.

Mr. A. A. Humphrey, Victoria Street, S.W.: Indian Corn.

Mr. W. Saw, Ivybridge: Apples.



FIG. 111. - H. T. ROSE 'MRS. GEORGE SAWYER' (*Lorr & Sawyer*).
(p. cxxviii.)

(To face p. cxxvi.)

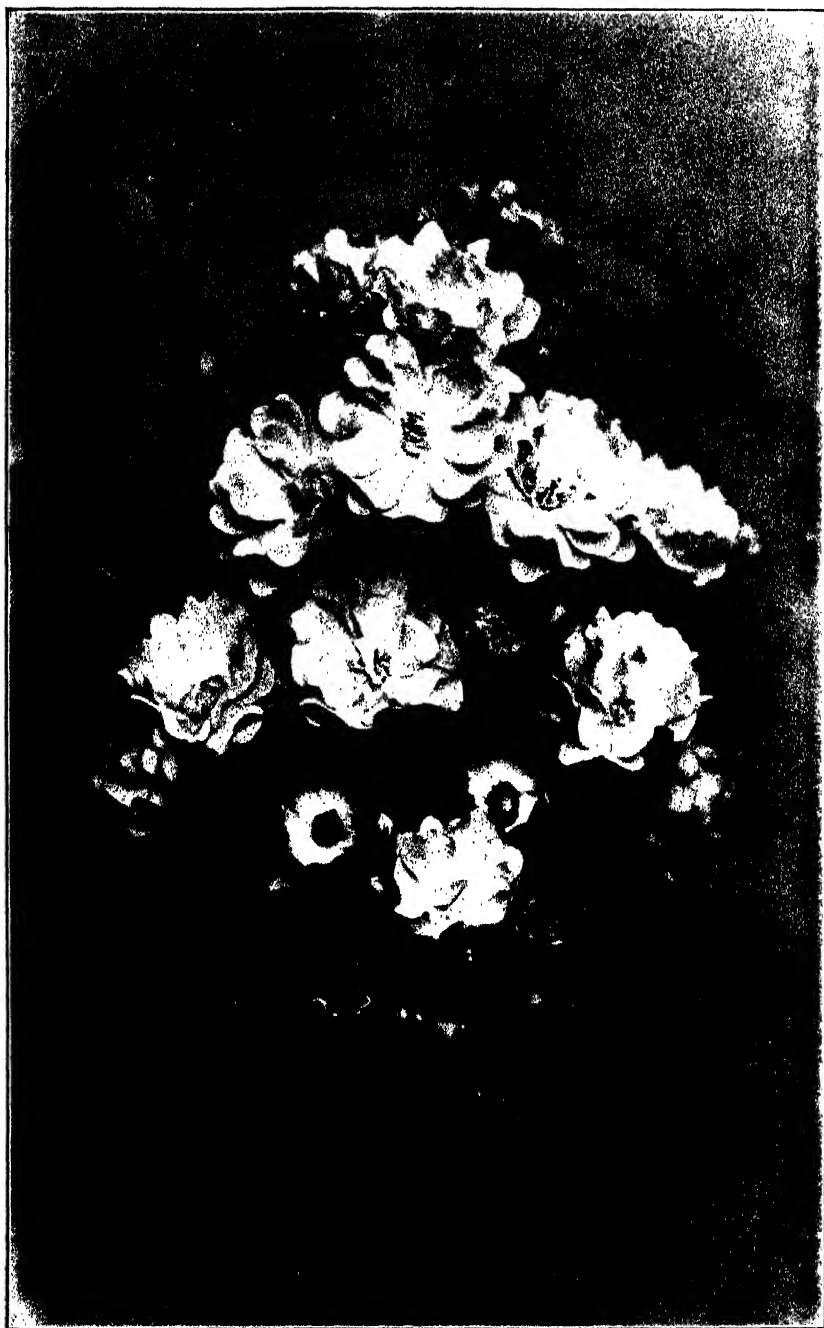


FIG. 112.—ROSE 'ORLEANS' (*W. Paul*). (p. cxxviii.)



FIG. 113.—DAVIDIA INVOLUCRATA. (*Gardeners' Chronicle.*) (p. cxxix.)



FIG. 114.—RHODODENDRON 'LITTLEWORTH CORALLINA,' (*Gardeners' Chronicle*.) (p. cxxxiii.)

FLORAL COMMITTEE.

MAY 9, 1911.

CHAIRMEN { Mr. W. MARSHALL, V.M.H. (Groups)
Mr. H. B. MAY, V.M.H. (Committee).
Twenty-four members present.

Awards Recommended:—

Gold Medal.

To Messrs. Rochford, Broxbourne, for Rambler Roses.

Silver-gilt Flora Medal.

To Mr. J. Douglas, Great Bookham, for Auriculas.

To Messrs. Mount, Canterbury, for Roses.

Silver-gilt Banksian Medal.

To Messrs. Veitch, Chelsea, for flowering trees and shrubs, Schizanthus, and Cinerarias.

Silver Flora Medal.

To Mr. H. Burnett, Guernsey, for Carnations.

To Messrs. Cutbush, Highgate, for Carnations, &c.

To Mr. M. Prichard, Christchurch, for alpinas.

Silver Banksian Medal.

To Messrs. Dobbie, Edinburgh, for Violas and Sweet Peas.

To Messrs. Low, Enfield, for Carnations, &c.

To Messrs. W. Paul, Waltham Cross, for Roses.

To Mr. H. Pulham, Elsenham, for alpinas.

Bronze Flora Medal.

To Messrs. Bakers, Codsall, for hardy plants.

To Mr. Hemsley, Crawley, for hardy plants.

To A. Wigan, Esq. (gr. Mr. Hill), Windsor, for Calceolarias.

To Messrs. May, Upper Edmonton, for flowering plants.

To Messrs. Phillips & Taylor, Bracknell, for Auriculas.

To Mr. L. R. Russell, Richmond, for Clematis and Salvias.

To Messrs. Ware, Feltham, for alpinas.

To Messrs. Young, Cheltenham, for Carnations.

Bronze Banksian Medal.

To Mr. J. Box, Lindfield, for hardy plants.

To Burton Hardy Plant Nursery, Christchurch, for hardy plants.

To Messrs. Cheal, Crawley, for hardy shrubs.

To E. J. Johnstone, Esq. (gr. Mr. Paskett), Groombridge, for Carnations.

Award of Merit.

To *Asplenium decorum* (votes, 12 for, 3 against), from Messrs. H. B. May, Upper Edmonton. This very useful decorative fern is a sport from *A. divaricatum*, which was shown for comparison and from which it differs in its more compact and plumose habit.

To *Hymenocallis festalis* (votes, 15 for), from A. Worsley, Esq., Isleworth. A cross between *Hymenocallis calathina* and *Elisena longipetala*, having pure white flowers borne on a stem 18 inches in height. The plant is more vigorous than either of the parents, and, with the exception of frame protection during the winter, has been grown and flowered out-of-doors (see *Gard. Chron.* Nov. 4, 1905, p. 322).

To *Rhododendron* 'Dawn's Delight' (votes, unanimous), from Miss Mangles, Seale, Surrey. This charming *Rhododendron* was raised by the late Mr. Mangles, and has white flowers $3\frac{1}{2}$ inches across, tinged with rose-pink, and spotted on the upper lobe with dark crimson. The base of the corolla is bright crimson, and the flowers are borne in large heads. The leaves are dark green on the upper surface and light green underneath, about $6\frac{1}{2}$ inches long by 2 inches broad. It is said to flower very freely at this season of the year, and to be quite hardy.

To Rose 'Mrs. George Shawyer' (votes, unanimous), from Messrs. Lowe & Shawyer, Uxbridge. A new seedling Hybrid Tea Rose, having pink flowers with very large petals and long, pointed buds. The great strength of the flower stalk and the good foliage indicate a very robust constitution. (Fig. 111.)

To Rose 'Orleans' (votes, unanimous), from Messrs. W. Paul, Waltham Cross. This Rose belongs to the dwarf Polyantha section, and has flowers $1\frac{1}{2}$ inch across crimson-carmine with white centres. It is very bushy in habit, about $2\frac{1}{2}$ feet high, and a perpetual bloomer. (Fig. 112).

To *Viola* 'Moseley Perfection' (votes, 10 for), from Messrs. Bakers, Codsall. A large deep yellow *Viola*, about $2\frac{1}{2}$ inches across.

Other Exhibits.

Messrs. Barr, Covent Garden: hardy plants.

Mr. Breadmore, Winchester: Sweet Peas.

Messrs. Bunyard, Maidstone: hardy plants.

Messrs. Butterfield, Waltham Cross: Pelargonium 'Queen Mary.'

Messrs. Cannell, Swanley: Calceolarias.

Messrs. Carter Page, London Wall: Violas, annuals, &c.

Messrs. Clark, Dover: hardy plants.

M. Correvo, Geneva: alpinas.

Mr. J. Crook, Camberley: Polyanthus.

Messrs. Eggett, Thames Ditton: hardy plants.

Mr. C. Elliott, Stevenage: alpinas.

Mr. Ellison, West Bromwich: ferns and Gerberas.

Messrs. Fells, Letchworth: hardy plants.

Mrs. Goschen, Addington; Amaryllis 'Mrs. H. Goschen.'

Guildford Hardy Plant Nursery, Guildford: hardy plants.
 Mr. A. Harwood, Colchester: hardy plants.
 Messrs. Heath, Cheltenham: hardy plants.
 Mr. Honess, Dorking; *Myosotis* 'Marie Raphael.'
 Misses Hopkins, Shepperton: hardy plants.
 Messrs. Jackman, Woking: hardy plants.
 Mr. W. J. Jenkins, Farnham: Pelargonium 'Emmeleine.'
 Mr. G. A. Keevil, Merthyr Vale: Pelargonium 'Coronation.'
 Mr. G. Kerswill, Exeter: *Gentiana acaulis*.
 King's Acre Nurseries, Hereford: Heliotropes.
 Mr. S. Mortimer, Farnham: Polyanthus.
 Messrs. G. Paul, Cheshunt: flowering shrubs.
 Messrs. Peed, Streatham: Japanese Maples.
 Mr. A. Perry, Enfield: hardy plants.
 Mr. G. Reuthe, Keston: hardy plants.
 Mr. V. Slade, Taunton: Zonal Pelargoniums.
 Messrs. Sutton, Reading: Cinerarias.
 Lord Swansea, Swansea: seedling Rhododendron.
 Mr. C. Turner, Slough: Roses and Carnations.
 Mr. C. F. Waters, Balcombe: Carnations.
 Messrs. Whitelegg & Page, Chislehurst: hardy plants:

FLORAL COMMITTEE, MAY 23, 1911.

TEMPLE SHOW.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-five members present.

[For awards of cups and medals made by the Council after consultation with the Judges, see p. lxxxviii.]

Awards Recommended:

First-class Certificate.

To *Davidia involucrata* (votes, 12 for), from Messrs. J. Veitch, Chelsea. This is a new and perfectly hardy tree introduced by Messrs. Veitch through their collector, Mr. E. H. Wilson, from the Province of Hupeh in Western China in 1903, and now flowering for the first time in Great Britain at Messrs. Veitch's Coombe Wood Nursery: The chief beauty of the tree lies in the two large pure white bracts which surround the flower. The bracts are roughly ovate in shape and unequal in size, the larger one being about 3 inches long, while the flowers are of no decorative value. The leaves are very handsome, broadly ovate, cordate at the base, acute, serrate, dark green, and mostly about 6 inches long by 4½ inches broad. Some dried specimens collected in China from adult trees showed much larger bracts than those borne on the sprays exhibited. A large tree of this interesting plant covered with numbers of the white bracts must be a very valuable and beautiful addition to any arboretum. (Fig. 113.)

Award of Merit.

To *Azalea* 'Duchess of Portland' (votes, unanimous), from Messrs. Cuthbert, Southgate. This new hybrid is said to be a cross between



FIG. 115.—*RHODODENDRON SUBLANCEOLATUM*. (*Gardeners' Chronicle*.) (p. cxxxix.)

A. mollis and *A. sinensis*. The flowers, borne in good trusses, are large, creamy yellow deeply tinged with salmon pink, especially at

the edges. The upper lobe is blotched with greenish yellow. The salmon tinge in this flower is quite a new colour in Azaleas.

To *Rhododendron sub lanceolatum* (votes, 8 for), from Mr. R. C. Notcutt, Woodbridge. Flowers large, about 4 inches across, clear pink with markings of a darker shade on the upper lobe, borne in heads, mostly of three. The short pedicels and the edges of the calyx are covered with long downy hairs. The leaves are small, ovate-lanceolate in shape, 2 inches long by $\frac{3}{4}$ inch broad. The plant is a Japanese species, and is not quite hardy in this country. (Fig. 115.)

To *Haberlea Ferdinandi Coburgii* (votes, 10 for), from Mr. G. Reuthe, Keston, Kent. This new alpine comes from the Balkans,



FIG. 116.—*LEWISIA COTYLEDON*. (*Gardeners' Chronicle*.)

and has large flowers borne three or four on a scape, of a pale lilac colour, with a very hairy white throat spotted with golden yellow. The tube of the corolla is violet on the upper side, and much lighter underneath. The calyx and pedicels are hairy, and the foliage large. The plant is in every way larger than *H. rhodopensis*, and is a stronger grower.

To *Lewisia Cotyledon* (votes, unanimous), from Mr. G. Reuthe, Keston, Kent. This interesting plant is the most beautiful of its genus. It was raised from seeds sent from Klondyke and has proved perfectly hardy on an exposed rockery in this country for the last four years. The flowers are about $1\frac{1}{4}$ inch across, white, with a broad band of

crimson running down the middle of each petal. The edges of the calyx and of the bracts are covered with glandular hairs. The foliage consists of small spatulate, fleshy, green leaves tinged with pink at the edges and arranged in rosettes. (Fig. 116.)

To *Lilium tenuifolium* 'Golden Gleam' (votes, 13 for), from Messrs. R. Wallace, Colchester. This new lily is similar to the type,



FIG. 117.—ROSE 'PORTIA.' (*The Garden*.) (p. cxxxiii.)

except in colour, which varies from deep reddish orange to a paler shade of orange.

To *Rhododendron* 'Corona' (votes, unanimous), from Messrs. John Waterer, Bagshot. A round cup-like flower of a charming orange pink colour, with a slight veining of a lighter shade. The large truss stands well above the foliage, is pyramidal in shape, and the individual flowers, which are borne on long pedicels, are very lightly arranged.

To *Rhododendron* 'Glory of Littleworth' (votes, 11 for), from Miss C. Mangles, Seale, Surrey. Flowers Azalea-like, about 2 inches

across, creamy white in colour with the upper lobes blotched with deep orange. They are borne in large trusses on pedicels about $1\frac{1}{2}$ inch long. Leaves, lanceolate, wrinkled, not stiff.

To *Rhododendron* 'Littleworth corallina' (votes, unanimous), from Miss C. Mangles, Seale, Surrey. A new hybrid *Rhododendron* with large pale lilac-rose, bell-shaped flowers of great beauty, which are borne on long pedicels in a loose truss. The base of the corolla is crimson. Leaves, ovate, flat, mucronate, deep glossy green. The flowers exhibited were cut from a tree 20 feet tall growing in the open. (Fig. 114.)

To *Rhododendron* 'Loder's White' (votes, unanimous), from Mr. G. Reuthe, Keston, Kent. A large flowered pure white *Rhododendron* having large trusses of flowers with crinkled petals. It is late flowering, and is said to be a cross between *R. Aucklandii* and *R. arboreum album*.

To Rose 'Portia' (votes, 11 for, 2 against), from Messrs. W. Paul, Waltham Cross. A new Hybrid Tea Rose of good form, with long buds and wide petals. Colour white, slightly tinged with pale blush pink. (Fig. 117.)

To Rose 'Sylvia' (votes, 10 for, 2 against), from Messrs. W. Paul, Waltham Cross. A hybrid Wichuraiana with double white flowers which are very sweetly scented. It is very free-flowering in habit.

Other Exhibits.

Messrs. Backhouse, York: Azaleas and *Ramondia pyrenaica rosea*.

The Burton Hardy Plant Nursery, Christchurch: *Sedum pilosum*.

Messrs. Godfrey, Exmouth: Pelargoniums.

Mr. W. F. Godwin, Ryde: Calceolarias.

Mr. Hemsley, Crawley: *Myosotis alpestris* 'Marie Raphael.'

Messrs. Hobbies, East Dereham: Clematis 'Laurustern.'

C. Louch, Esq., Totton: hybrid Primulas.

Messrs. S. Low, Enfield: Hydrangeas.

Mr. G. Miller, Wisbech: Pyrethrum 'Queen Mary.'

Messrs. G. Paul, Cheshunt: *Rhododendrons*.

Messrs. Strudwick, Kensington: Pelargonium 'Comber's Pink.'

Messrs. Taylor, Tunbridge Wells: Clematis 'Queen Mary.'

Messrs. W. T. Ware, Bath: Tulip 'Inglescombe Yellow.' **A.M.**

May 15, 1906.

FLORAL COMMITTEE, JUNE 6, 1911.

CHAIRMEN { Mr. W. MARSHALL, V.M.H. (Groups).
 { Mr. H. B. MAY, V.M.H. (Committee).
 Sixteen members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Bath, Wisbech, for herbaceous plants.

To Mr. C. Blick, Hayes, for Carnations.

- To Mr. J. Box, Lindfield, for hardy plants.
- To Messrs. Bunyard, Maidstone, for hardy plants.
- To Messrs. Clark, Dover, for hardy plants.
- To Messrs. May, Upper Edmonton, for miscellaneous plants.
- To Messrs. Mount, Canterbury, for Roses.
- To Mr. A. Perry, Enfield, for Irises.

Silver Banksian Medal.

- To Messrs. Bakers, Codsall, for hardy plants.
- To Messrs. Cannell, Swanley, for Pelargoniums.
- To Messrs. B. R. Cant, Colchester, for Roses.
- To Messrs. Cutbush, Highgate, for Carnations.
- To Messrs. Dobbie, Edinburgh, for Sweet Peas and Aquilegias.
- To Messrs. Kelway, Langport, for hardy plants.
- To Messrs. S. Low, Bush Hill Park, for Carnations.
- To Messrs. Peed, West Norwood, for Gloxinias and hardy plants.
- To Leopold de Rothschild, Esq., C.V.O. (gr. Mr. Hudson, V.M.H.), Acton, for Sweet-scented Pelargoniums in flowers.*
- To Messrs. Whitelegg & Page, Chislehurst, for hardy plants.

Bronze Flora Medal.

- To Guildford Hardy Plant Nursery, Guildford, for hardy plants.

Bronze Banksian Medal.

- To Messrs. Brown, Peterborough, for hardy plants.
- To Messrs. Carter Page, London Wall, for annuals, Dahlias, &c.
- To Misses Hopkins, Shepperton, for hardy plants.
- To Messrs. Jackman, Woking, for hardy plants.
- To Mr. G. Reuthe, Keston, for hardy plants.
- To Mr. L. R. Russell, Richmond, for Primulas.
- To Messrs. Ware, Feltham, for hardy plants.

Award of Merit.

To *Crinum Johnstonii* (votes, unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H. (gr. Mr. Bain), Dorking. This remarkable *Crinum*, which has flowered out-of-doors at Dorking, is a native of British Central Africa, and was originally found on Mount Zomba. The flowers are white, slightly tinged with pink on the back of the perianth segments, which are ovate or oblong in shape and acute. The perianth tube is about 4 inches long. The specimen exhibited carried over twenty flowers and buds in an umbel, the pedicels being slightly over 1 inch long. The leaves are bright green, four to five feet long, narrowed gradually to a long point, and 6½ inches broad at the widest part. The plant is named in honour of Sir Henry Hamilton Johnston, K.C.B., late H.M. Commissioner and Consul-General for territories north of the Zambesi.

To *Grevillea robusta compacta* (votes, unanimous), from Mr. R. B.

* The Council awarded a *Certificate of Appreciation* to Mr. J. Hudson, V.M.H., in recognition of his work in raising bedding Pelargoniums.



FIG. 118.—GREVILLEA ROBUSTA COMPACTA. (*Gardeners' Chronicle.*) (p. cxxxiv.)
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Leech, College Road, Dulwich. This very handsome foliage plant is more compact than the type, and the specimen exhibited was well furnished with leaves of medium size to the base of the main stem. (Fig. 118.)

To *Heuchera sanguinea* 'Nancy Perry' (votes, 6 for, 2 against), from Mr. Amos Perry, Enfield. The flowers of this charming hardy plant are bright rose in colour, shading to deep rose pink at the edge of the corolla. The spikes are about 2½ feet high and are covered with a great number of flowers.

To *Iris variegata* 'Miss Eardley' (votes, 8 for, 3 against), from Mr. Amos Perry, Enfield. The standards of this lovely Iris are lemon yellow, and the falls deep purple with a broad yellow edge. The bases of the falls are reticulated with white, and the beard is bright orange. The plant grows about 2 feet tall.

To *Primula pulverulenta* 'Hidcote strain' (votes, unanimous), from L. W. Johnston, Esq., Hidcote Manor, Campden, Glos. The strain has the habit of the type, but the flowers are mostly of a light rose colour with a greenish yellow centre.

Cultural Commendation.

To J. T. Bennett-Poë, Esq., M.A., V.M.H., Cheshunt (gr. Mr. Downes), for *Utricularia montana*, F.C.C. June 5, 1872.

Other Exhibits.

Messrs. Barr, Covent Garden: Irises.

Messrs. Benary, Erfurt, Germany: Stocks.

Mr. J. Bradshaw, Southgate: *Geum* × 'John Bradshaw.'

Mr. J. Douglas, V.M.H., Great Bookham: border Carnations.

Mr. W. Farr, Swindon: bloom protectors.

R. Gordon, Esq., Betchworth: Border Carnation 'Brockham Gem.'

Mr. G. W. Miller, Wisbech: Pyrethrums.

Messrs. Reamsbottom, Geashill: Anemones.

Marquis of Ripon, Kingston: Ivy-leaf Pelargonium 'Dorothy.'

Mr. G. Whitwell, Kendal: *Holcus mollis* Whitwellii.

FLORAL COMMITTEE, JUNE 20, 1911.

CHAIRMEN { Mr. W. MARSHALL, V.M.H. (Groups).
 { Mr. H. B. MAY, V.M.H. (Committee).

Twenty members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Mr. Amos Perry, Enfield, for Delphiniums.

Silver-gilt Banksian Medal.

To Mr. James Box, Lindfield, for hardy plants and Sweet Peas.

To Messrs. Brown, Peterborough, for Roses.

- To Messrs. Jackman, Woking, for hardy plants and Roses.
- To Mr. J. MacDonald, Harpenden, for grasses.
- To Messrs. S. Low, Bush Hill Park, for Malmaisons.

Silver Flora Medal.

- To Mr. W. E. Alsen, Deninead, for Sweet Peas.
- To Mr. C. Blick, Hayes, for Carnations.
- To Messrs. Bunyard, Maidstone, for hardy plants.
- To Messrs. Cheal, Crawley, for shrubs.
- To G. Ferguson, Esq., Weybridge, for Delphiniums.
- To Mr. E. L. Hicks, Twyford, for Roses.
- To Messrs. G. Paul, Cheshunt, for Paeonies.
- To Mr. M. Prichard, Christchurch, for hardy plants.
- To Mr. G. Reuthe, Keston, for hardy plants.
- To Messrs. Veitch, Chelsea, for Carnations, &c.

Silver Banksian Medal.

- To Mr. H. Burnett, Guernsey, for Carnations.
- To Messrs. B. R. Cant, Colchester, for Roses.
- To Messrs. Frank Cant, Colchester, for Roses.
- To Lord Hillingdon, Uxbridge, for Nymphaeas.
- To Messrs. Jones, Shrewsbury, for Sweet Peas.
- To Messrs. May, Upper Edmonton, for miscellaneous plants.
- To Messrs. W. Paul, Waltham Cross, for Roses.
- To Mr. L. R. Russell, Richmond, for hardy shrubs.
- To Messrs. Spooner, Woking, for Roses.

Bronze Flora Medal.

- To Messrs. Barr, Covent Garden, for hardy plants.
- To Messrs. Bath, Wisbech, for Delphiniums.
- To Messrs. Bull, Chelsea, for Irises.
- To Messrs. Godfrey, Exmouth, for 'Canterbury Bells.'
- To Messrs. Mount, Canterbury, for Roses.
- To Messrs. Phillips & Taylor, Bracknell, for water and bog plants.
- To Messrs. Ware, Feltham, for hardy plants.

Bronze Banksian Medal.

- To Messrs. Cannell, Swanley, for Hydrangeas, Pelargoniums, &c.
- To Messrs. Carter Page, London Wall, for Dahlias, &c.
- To Messrs. Cutbush, Highgate, for Carnations.

First-class Certificate.

To *Philadelphus Lemoinei* 'Virginal' (votes, unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H. (gr. Mr. Bain), Barford Lodge, Dorking. The flowers of this splendid hardy shrub are pure white in colour, $1\frac{1}{2}$ inch across, and semi-double. The petals are broadly ovate, and many of the stamens are petaloid. The leaves are ovate, being $2\frac{1}{2}$ inches long by $1\frac{1}{2}$ inch broad at the widest part; slightly serrated; dark green on the upper surface, and thickly covered with white hairs underneath. The plant is extremely free in flowering,

and the opinion was expressed that it is the finest variety of *Philadelphus* shown up to the present.

Award of Merit.

To Carnation 'Charlotte Brontë' (votes, 8 for, 2 against), from Mr. C. Blick, Hayes, Kent. A deep rose, border variety, having large flowers of nice form, with an exceptionally strong Clove scent. The flower-stems are very stiff, rendering the blooms useful for vases.

To Carnation 'F. W. Goodfellow' (votes, 12 for), from Mr. C. Blick. A good border Picotee variety, having a perfectly clear sulphur-yellow ground, edged with rose-pink. (Fig. 119.)

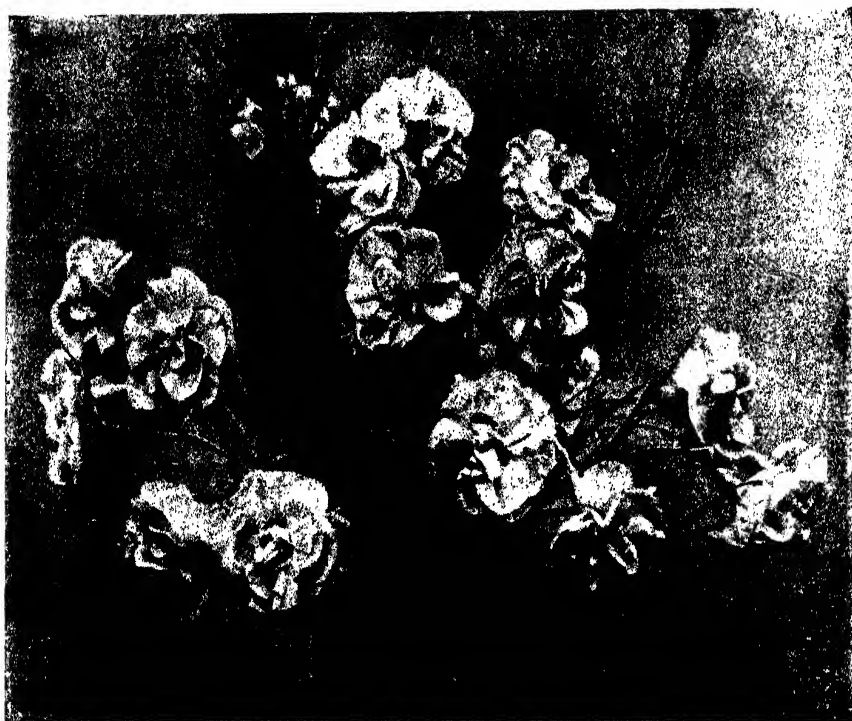


FIG. 119.—CARNATION 'F. W. GOODFELLOW.' (Blick.)

To Delphinium 'Mauve Queen' (votes, unanimous), from G. Ferguson, Esq. (gr. Mr. F. W. Smith), The Hollies, Weybridge. Flowers large, semi-double, 2 inches across, of a charming mauve colour, tinged with light blue; centre creamy-white; borne on large, well-furnished spikes.

To Delphinium 'Primrose Queen' (votes, 9 for), from G. Ferguson, Esq. The flowers of this variety are semi-double, and of a pale primrose colour, deepening towards the centre. They are about 2 inches across, and are borne on a medium spike.

To Sweet Pea 'R. F. Felton' (votes, unanimous), from Mr. R. Bolton, Warton, Carnforth. A lovely mauve variety with paler wings.

It has a fine bold standard, beautifully waved, and measuring 2 inches across. The flowers are borne mostly in fours on very strong stems.

Other Exhibits.

Mr. Francis Baillie, Liberton: *Pyrethrum* 'Stenhouse Beauty.'

Messrs. Clark, Dover: hardy plants.

Messrs. Dobbie, Edinburgh: Sweet Peas.

Mr. W. Easlea, Eastwood: Roses.

Mr. C. Elliott, Stevenage: hardy plants.

Mr. A. A. Fabius, Emsworth: Ferns.

Guildford Hardy Plant Nursery, Guildford: hardy plants.



FIG. 120.—*DRACAENA DEREMENSIS* WARNECKII. (*Gardeners' Chronicle*.) (p. cx.)

Mr. A. J. Harwood, Colchester: hardy plants.

Misses Hopkins, Shepperton: hardy plants.

Messrs. Kelway, Langport: Delphiniums.

Mr. H. C. Pulham, Stansted: hardy plants.

Mr. Herbert Roper, Sydenham: *Carnation* 'Mrs. Herbert Roper,' and *Pelargonium* 'Miss Freda Roper.'

Messrs. Walters, Bath: Delphiniums.

Mr. C. F. Waters, Balcombe: *Carnations*.

Messrs. Wells, Merstham: *Phlox* and *Pentstemons*.

Messrs. Whitelegge & Page, Chislehurst: *Violas*, &c.

FLORAL COMMITTEE, JULY 4, 1911.

AT OLYMPIA.

MR. WILLIAM MARSHALL, V.M.H., in the Chair, and sixteen members present.

[For awards of cups and medals made by the Council after consultation with the Judges, see p. xciv.]

Awards Recommended:—

Award of Merit.

To *Dracaena deremensis Warneckii* (votes, unanimous) from Messrs. J. Veitch, Chelsea. A very distinct ornamental foliage plant, having sharply pointed leaves about 1 foot long by 2 inches broad. A broad band of well-defined white variegation fills the middle of the leaf throughout its length, tapering to a point at the sharp tip, and leaving on either side a deep green margin about $\frac{1}{4}$ inch broad. (Fig 120.)

To *Gladiolus nanus* 'Queen Mary' (votes, unanimous), from Messrs. C. Smith, Caledonia Nursery, Guernsey. This charming variety belongs to the early-flowering section, and has pale salmon-pink flowers measuring over 3 inches across, the three lower petals being blotched with cream. The blotches are surrounded with a very faint tinge of rosy crimson. The spikes exhibited carried eight or nine open flowers and buds.

To *Pelargonium* 'Lord Bute' (votes, 8 for, 3 against), from Mr. W. Treseder, Cardiff. A plant of robust constitution, having small, deep velvety, maroon flowers, with a narrow edging of rose, borne in trusses of five or six.

To Rose 'Frances Charteris Seton' (votes, 6 for, 1 against), from Messrs. W. Paul, Waltham Cross. This is a bright rose Hybrid Tea of good form and size, with recurving outer petals and pointed buds. It is said to be a very strong grower (fig. 121).

To Rose 'Leslie Holland' (votes, unanimous), from Mr. Hugh Dickson, Belfast. A deep scarlet crimson Hybrid Tea of good substance, with long buds and an exquisite scent.

To Rose 'Mrs. Charles E. Allan' (votes, 6 for, 1 against), from Mr. Hugh Dickson. An apricot-tinted Hybrid Tea variety of good form, with recurving petals and a free-flowering habit.

To Sweet Pea 'Lady Knox' (votes, unanimous), from Messrs. Dobbie, Edinburgh. A very charming variety, having a ground colour of cream beautifully edged with buff on the standard. Most of the sprays carried four exceptionally large flowers. (Fig 122.)

Other Exhibits.

Sir Randolph Baker, Bart., Blandford: Sweet Pea 'Bertie Usher.'
P. W. Cobbold, Esq., Felixstowe: *Gladiolus* hybrids.

Mr. W. Deal, Kelvedon: Sweet Williams.

Mr. C. Elliott, Stevenage: *Campanula pusilla* 'Miss Willmott.'

Mr. Hemsley, Crawley: Ivy-leaf Pelargonium 'Queen Mary.'

Mr. Philip Le Cornu, Jersey: Roses.

Mrs. Martineau, Twyford: *Salvia Sclarea*.

F. May, Esq., Radlett: Carnation 'Houndwood Beauty.'

Mr. V. Slade, Taunton: Pelargonium 'Miss Popham.'

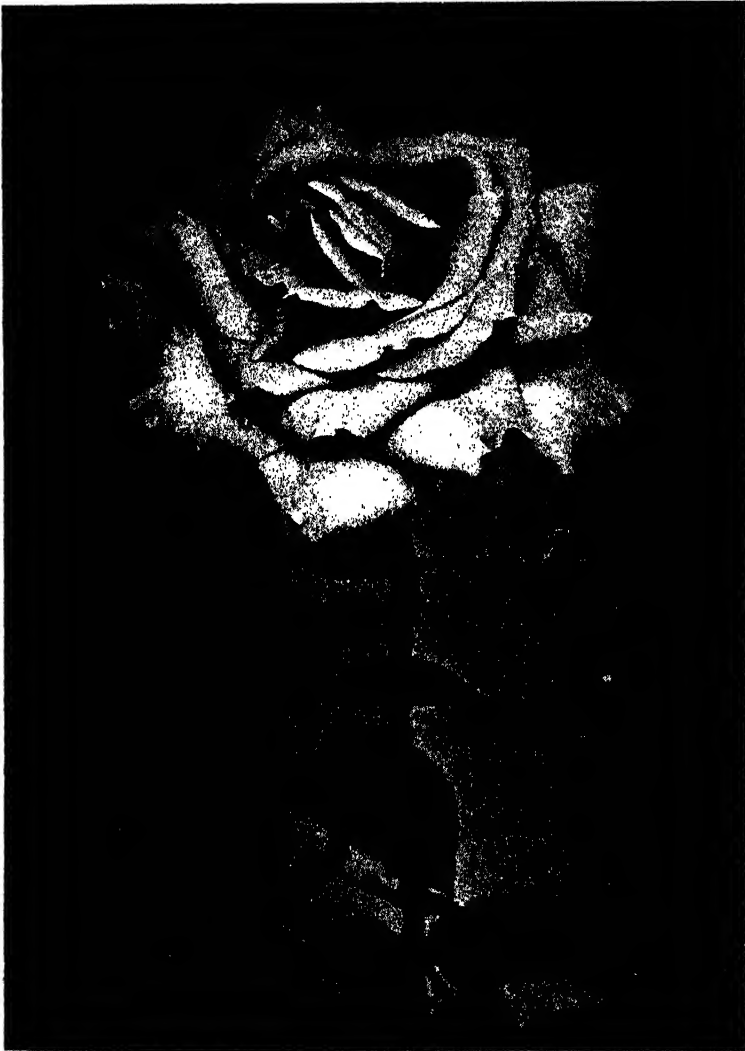


FIG. 121.—ROSE 'FRANCES CHARTERIS SETON.' (*The Garden*.) (p. cxl.)

Messrs. Stark, Great Ryburgh: Tritomas.

Messrs. Sutton, Reading: Sweet Pea 'Southcote Blue.'

Gebrüder Teufel, Quedlinburg, Germany: Acalyphas.

Messrs. Wallace, Colchester: hardy plants.

Messrs. Walters, Bath: Pelargonium 'Beauty of Kensington.'

C. Weigand, Soden a/Taunus, Germany: Rose 'Sodenia.'

FLORAL COMMITTEE, JULY 14, 1911.

AT WISLEY.

MR. MARSHALL, V.M.H., in the Chair, and eight members present.

Awards Recommended :—

Award of Merit.

To Sweet Pea 'Helen Pierce,' from Messrs. Dobbie, Edinburgh.

To Sweet Pea 'Marie Corelli,' from Messrs. Dobbie.

To Sweet Pea 'Nubian,' from Messrs. Dobbie.

To Sweet Pea 'Queen of Spain Spencer,' from Messrs. Dobbie.

Highly Commended for Garden Decoration :—

'Aurora Spencer.'

'Princess Victoria.' A.M. July 9, 1907.

'Ivanhoe.' A.M. June 21, 1910.

'Elsie Herbert.' A.M. July 9, 1907.

'Dorothy Eckford.' A.M. September 2, 1902.

'Gladys Unwin.'

'Isobel Malcolm.'

'Mrs. Collier.'

'Lady Althorp.'

'Asta Ohn.'

'Etta Dyke.'

'Elfrida Pearson.' A.M. July 19, 1910.

'Apple Blossom Spencer.'

'Tennant Spencer.'

Dobbie's 'Sunproof Crimson.' A.M. June 21, 1910.

'Countess Spencer' (true).

All the foregoing were grown at Wisley from seed sent by Messrs. Dobbie. For descriptions see Report on Sweet Peas (p. 394).

FLORAL COMMITTEE, JULY 18, 1911.

CHAIRMEN { MR. W. MARSHALL, V.M.H. (Groups).
 { MR. H. B. MAY, V.M.H. (Committee).
 Twenty-six members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Hon. Vicary Gibbs (gr. Mr. E. Beckett), Aldenham House, Elstree, for Cape Pelargoniums.

Silver-gilt Banksian Medal.

To Mr. A. F. Dutton, Iver, for border Carnations.

To Messrs. Veitch, Chelsea, for Gloxinias, Roses, &c.



FIG. 122.—SWEET PEA 'LADY KNOX.' (*Dobbie*.) (p. cxl.)

(To face p. cxl.)

Silver Flora Medal.

- To Messrs. B. R. Cant, Colchester, for Roses.
- To Messrs. Outbush, Highgate, for Carnations.
- To Mr. J. Douglas, Great Bookham, for border Carnations.
- To Messrs. May, Upper Edmonton, for ferns.
- To Mr. A. Perry, Enfield, for hardy ferns and water lilies.
- To Mr. L. R. Russell, Richmond, for Caladiums.
- To Messrs. Wells, Merstham, for Phloxes.

Silver Banksian Medal.

- To Messrs. Frank Cant, Colchester, for Roses.
- To Messrs. Gunn, Olton, for Phloxes.
- To Messrs. Jones, Lewisham, for Phloxes and Zonal Pelargoniums.
- To Mr. F. Lilley, Guernsey, for Gladioli.
- To Messrs. S. Low, Bush Hill Park, for Roses and Carnations.
- To Mr. N. Prichard, Christchurch, for hardy plants.

Bronze Flora Medal.

- To Messrs. G. Paul, Cheshunt, for Roses.
- To Mr. G. Reuthe, Keston, for hardy plants.

Award of Merit.

To Canna 'Fraulein E. Kracht' (votes, unanimous), from Messrs. J. Veitch, Chelsea. A tall, vigorous variety, with large heads of rosy-salmon flowers.

To Carnation 'Dora Blick' (votes, 12 for, 2 against), from Mr. C. Blick, Hayes, Kent. A scented border variety of splendid form and good size, and of an orange-buff colour.

To Carnation 'Herbert Newman' (votes, 18 for), from Mr. A. F. Dutton, Iver, Bucks. A large border variety of good form, with a white ground striped with scarlet. The flower-stems, which were 2½ feet long, indicated the exceptional vigour of this Carnation.

To Carnation 'James Quin' (votes, 11 for, 5 against), from Mr. C. Blick, Hayes, Kent. A "fancy" border Carnation, having a buff ground suffused with rosy crimson.

To Carnation 'King George' (votes, 10 for, 3 against), from Mr. C. Blick. An excellent pure white border variety, sweetly scented.

To Carnation 'Mrs. Andrew Brotherston' (votes, 14 for, 2 against), from Mr. J. Douglas, Great Bookham. A large crimson fancy border variety, much speckled with white. It is perfect in form and very fragrant.

To Carnation 'Mrs. Elliot Douglas' (votes, unanimous), from Mr. J. Douglas. A rich golden-yellow border Carnation of perfect form.

To *Eremurus Olgae alba* (votes, 16 for), from the King's Acre Nursery, Hereford. A pure white form of *Eremurus Olgae*, growing to the height of 4 feet, and having well-furnished spikes of flowers, which measure 1 inch across when fully open. The stamens are bright orange in colour. The leaves are glaucous, triangular in section, and about

2 to 2½ feet long. The plants were imported from an elevation of 7,000 feet above sea-level in the Highlands of Persia (fig. 124).

To *Fokienia Hodginsii* (votes, unanimous), from Miss Wyburn (gr. Mr. Jones), Hadley Manor, Barnet. This is a species of a new

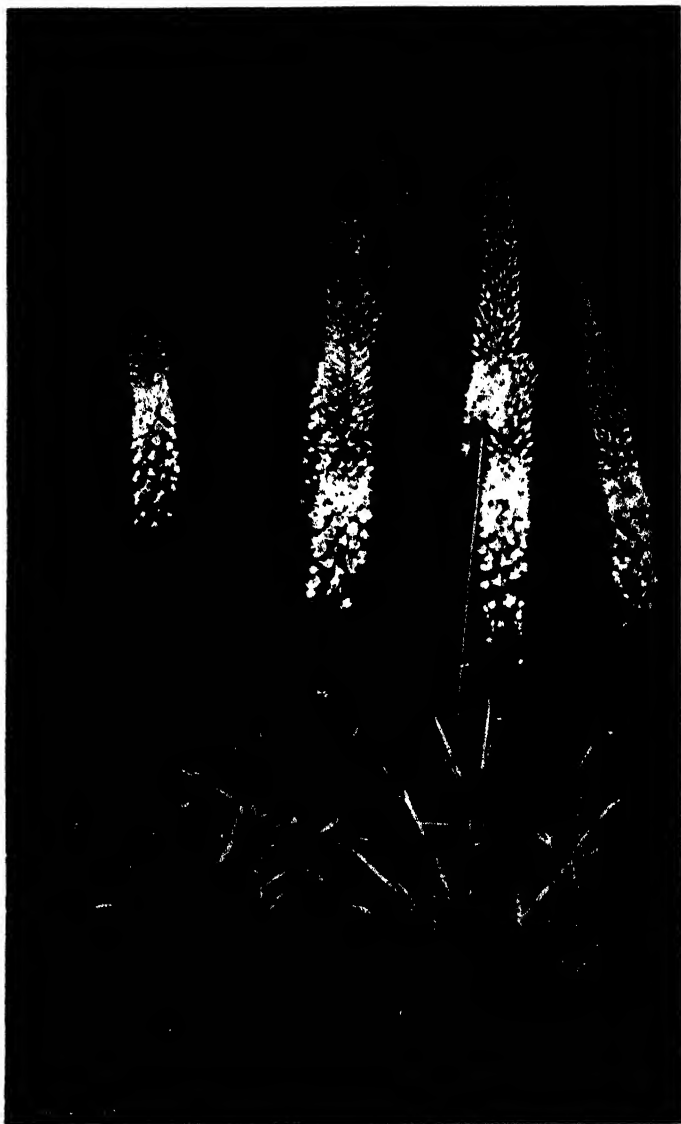


FIG. 124.—*EREMURUS OLGAÆ ALBA*. (Kelway.) (p. cxliii.)

genus of conifers intermediate in its characters between *Cupressus* and *Libocedrus*. The foliage is carried in flattened branchlet-systems, in which each leaf-bearing branch is tripinnately divided, while all the pinnæ are disposed in one plane. The leaves on the young plants exhibited were about ¼ inch long, all ending in a sharp point. They



FIG. 123.—*PLAGIANTHUS LYALLII*. (*Gardeners' Chronicle*.) (p. cxlv.)

(To face p. cxlv.)

were green on the upper surface, and marked with a long white streak underneath. Some of the plants exhibited were imported from China in April 1911, and others were raised from seed sown at Hadley Manor, Barnet, on April 4, 1910.

To *Plagianthus Lyallii* (votes, unanimous), from C. J. Lucas, Esq., Warnham Court, Horsham. A beautiful New Zealand flowering shrub belonging to the *Malvaceae*. The flowers are white and about 1 inch across, and have five ovate petals and a bunch of golden anthers. The peduncles, which are about 1 inch long, arise usually in fours in the axils of the leaves, and carry one flower each. The leaves are lanceolate, cordate, acuminate, deeply crenated, and light green. (Fig 123.)

To Rose 'Nerissa' (votes, 9 for), from Messrs W. Paul, Waltham Cross. A new Hybrid Tea of a deep cream shade suffused with pink. It is of good form and substance, and a vigorous grower.

Other Exhibits.

Messrs. Bide, Farnham: Roses.

Messrs. Box, Lindfield: Sweet Peas.

T. Burchell, Esq., Sevenoaks: Carnation 'Miss Ethel Burchell.'

Mr. T. Carter, Glastonbury: Carnation 'Mrs. Tom Carter.'

Messrs. Clark, Dover: hardy plants.

Mr. A. Collins, Hampton Court: Delphinium 'Queen of the Whites.'

Mrs. Curzon, Watermouth Castle, North Devon: Carnation 'Mrs. Curzon.'

Mr. G. D. Davison, Norwich: *Lathyrus latifolius magnificus*.

Mr. W. Deal, Kelvedon: Sweet Peas.

Messrs. Dobbie, Edinburgh: Sweet Peas and Marigolds.

Peter Gatley, Esq., Altrincham: Rose 'Golden Glow.'

Mr. F. W. Godding, Hanworth: Carnation 'Lady Nora.'

W. H. N. Goschen, Esq., Harlow: Carnations.

Guildford Hardy Plant Nursery, Guildford: hardy plants.

Mr. A. J. Harwood, Colchester: hardy plants.

Messrs. Kelway, Langport: hardy plants.

M. Le Cornu, Jersey: Rose 'Duchess of Normandy.'

Misses Le Lacheur & Sherris, Henfield: Carnations.

Mrs. Martineau, Twyford: *Salvia Sclarea*.

R. M. Neill, Esq., Manchester: Campanulas.

E. H. Packy, Esq., Loughborough: seedling Delphinium.

Messrs. Phillips & Taylor, Bracknell: Carnations.

L. Salomons, Esq., Dorking: Carnation 'Grace Norbury.'

Messrs. Ware, Feltham: hardy plants.

Mr. W. A. Watts, St. Asaph: Carnation 'W. A. Watts.'

FLORAL COMMITTEE, AUGUST 1, 1911.

CHAIRMAN { Mr. W. MARSHALL, V.M.H. (Groups).
 { Mr. H. B. MAY, V.M.H. (Committee).

Twenty-four members present.

Awards Recommended :—

Silver Flora Medal.

To Mr. J. Box, Lindfield, for hardy plants.

To Messrs. May, Upper Edmonton, for ferns, &c.

To Mr. Paine, Tully Nurseries, Kildare, for Gladioli.

To Messrs. Veitch, Chelsea, for greenhouse plants.

Silver Banksian Medal.

To Messrs. Cannell, Swanley, for Cannas.

To Messrs. Carter, Raynes Park, for Gloxinias.

Bronze Flora Medal.

To Mr. G. Reuthe, Keston, for hardy plants.

To Messrs. Ware, Feltham, for hardy plants.

To Messrs. Webb & Brand, Saffron Walden, for Hollyhocks.

Award of Merit.

To Canna 'Terra Cotta' (votes, 13 for, 2 against), from Messrs. J. Veitch, Chelsea. The flowers of this handsome variety have smooth petals, are of a rich clear orange colour, and are borne in very large trusses.

To Carnation 'Mrs. Wharton' (votes, 9 for, 2 against), from Mr. J. R. Batty, Skelton Castle Gardens, Yorks. A new seedling border variety of perfect form and of good size. The colour is a rich shade of apricot, and the edges of the petals are nicely crinkled.

To *Cornus paucinervis* (votes, 15 for, 2 against), from Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Aldenham House, Elstree. This is a very useful dwarf bushy evergreen shrub introduced by Mr. E. H. Wilson from China. It is perfectly hardy and grows about 5 or 6 feet tall. The specimen exhibited was in a pot, and about 2 feet in height. The leaves have short petioles, and are lanceolate in shape, about 2 inches long by $\frac{1}{2}$ inch broad. The small creamy-white flowers measuring about $\frac{1}{2}$ inch across are borne in numerous flat corymbs terminating the branches. The scent is rather strong, and the bark has a purplish tinge.

To *Itea ilicifolia* (votes, unanimous), from Hon. Vicary Gibbs. Another Chinese shrub raised from seeds sent home by Mr. E. H. Wilson. The leaves, which are about $2\frac{1}{2}$ inches long, resemble those of Holly in shape and texture, but are of a lighter green. The small greenish flowers are borne in cylindrical pendulous racemes, about 6 inches long and $\frac{1}{2}$ inch in diameter. The plant is said to be hardy.

To *Mussaenda erythrophylla* (votes, unanimous), from Messrs. J.

Veitch, Chelsea. A striking stove plant from tropical Africa. The flowers are tubular, with a spreading disc of pale yellow, having a crimson centre. The most noticeable feature of the plant is the curious development of one of the sepals of some of the flowers into a light carmine leaf-like structure, cordate in shape, and about $3\frac{1}{2}$ inches in length. The flower-stalk, calyx, and outside of the corolla are covered with crimson hairs. The foliage leaves are ovate and light green.

Other Exhibits.

Messrs. Bakers, Codsall: *Tunica Saxifraga alba plena*.

Mrs. Greavs, Quenby Hall, Leicester: Carnations.

Messrs. Homan, Noordwijk: Gladioli.

Mr. G. Koiyumi, 35 Bessborough Gardens, S.W.: Japanese dwarf trees.

Messrs. G. Paul, Cheshunt: Phloxes.

To Messrs. Price & Fyfe, Lee: *Chrysanthemum maximum* 'Dora.'

W. Clowes Pritchard, Esq., St. Leonards-on-Sea: Carnation 'Ethel Pritchard.'

Mr. J. Stephenson, Chesterfield: *Viola cornuta* var.

FLORAL COMMITTEE, AUGUST 15, 1911.

Mr. G. GORDON, V.M.H., in the Chair, and six other members present.

There were no awards recommended on this occasion.

Exhibits.

G. Comber, Esq., Rowley Brow, Knutsford, Cheshire, sent a fern for naming which the Committee considered to be a good congested form of *Lastrea dilatata*.

Mr. A. Hilton, Worthing: Pelargonium 'The Chancellor.'

The Lady Mabel Kenyon-Slaney, Hatton Grange, Shifnal, sent a decorative Carnation named 'Rodolph.' The flower is somewhat small, but has the merit of never bursting its calyx. The colour is that of the 'Old Clove,' and it has much of its beautiful scent. It is no doubt an excellent variety for decorative work, and a free bloomer.

Mr. A. Langley Smith, Catford: hybrid scented-leaved Pelargoniums.

FLORAL COMMITTEE, AUGUST 29, 1911.

Mr. H. B. MAY, V.M.H., in the Chair, and nineteen members present.

Awards Recommended :—

Gold Medal.

To Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Aldenham House, Elstree, for a large collection of trees and shrubs raised from seed sent from China by Mr. E. H. Wilson.

Silver-gilt Flora Medal.

To Messrs. Carter Page, London Wall, for Dahlias.

To Colonel Lockwood (gr. Mr. G. Craddock), Bishop's Hall, Romford, for Acalyphas.

Silver Banksian Medal.

To Mr. J. Box, Lindfield, for hardy plants.

To Messrs. Cannell, Swanley, for Cannas and Begonias.

To Messrs. Cheal, Crawley, for Dahlias.

To Messrs. Cutbush, Highgate, for hardy plants.

To Messrs. Kelway, Langport, for Gladioli.

To Messrs. May, Upper Edmonton, for Veronics and ferns.

To Messrs. Veitch, Chelsea, for greenhouse plants

Bronze Banksian Medal.

To Mr. Amos Perry, Enfield, for Delphiniums and Nymphaeas.

To Messrs. Ware, Feltham, for hardy plants.

Award of Merit.

To Dahlia 'Bridesmaid' (votes, unanimous), from Messrs. Cheal, Crawley. A good single variety, about 3 inches across, of a pleasing rosy-lilac shade with a golden-yellow centre.

To Dahlia 'Killarney' (votes, unanimous), from Messrs. Cheal, Crawley. Another single, similar in size to the above, but of a good buff colour, with a zone of red round the golden-yellow centre.

To Dahlia 'Mrs. Stephens' (votes, unanimous), from Messrs. Stredwick, St. Leonards-on-Sea. A splendid 'Cactus' variety of good form and size. The colour is pale sulphur-yellow, and the petals are slightly twisted.

To Dahlia 'Turtle Dove' (votes, unanimous), from Messrs. Stredwick, St. Leonards-on-Sea. A good 'Cactus' Dahlia of a curious reddish-rose tint, almost shading to white at the outside petals. The flowers are of good form, and about 6 inches across.

To Gladiolus 'Yellow Beauty' (votes, 15 for), from Messrs. Kelway, Langport. The flowers are large, pale sulphur-yellow, with a tinge of crimson at the base of the petals. The two lower petals have a somewhat greenish tinge. The spikes are good, and carry a large number of blooms.

To *Hibiscus syriacus* 'Snowdrift' (votes, 9 for, 3 against), from Mr. R. C. Notcutt, Woodbridge. Flowers funnel-shaped, pure white, and about 3 inches across, borne in the axils of the leaves, and having a mass of creamy-yellow stamens in the centre. The leaves are alternate, ovate, wedge-shaped, three-lobed and toothed.

To *Nymphaea Gladstoniana* (votes, unanimous), from Leopold de Rothschild, Esq., C.V.O. (gr. Mr. J. Hudson, V.M.H.), Gunnersbury House, Acton. This handsome variety is pure white, with a large mass of golden-yellow stamens in the centre. The flowers are of

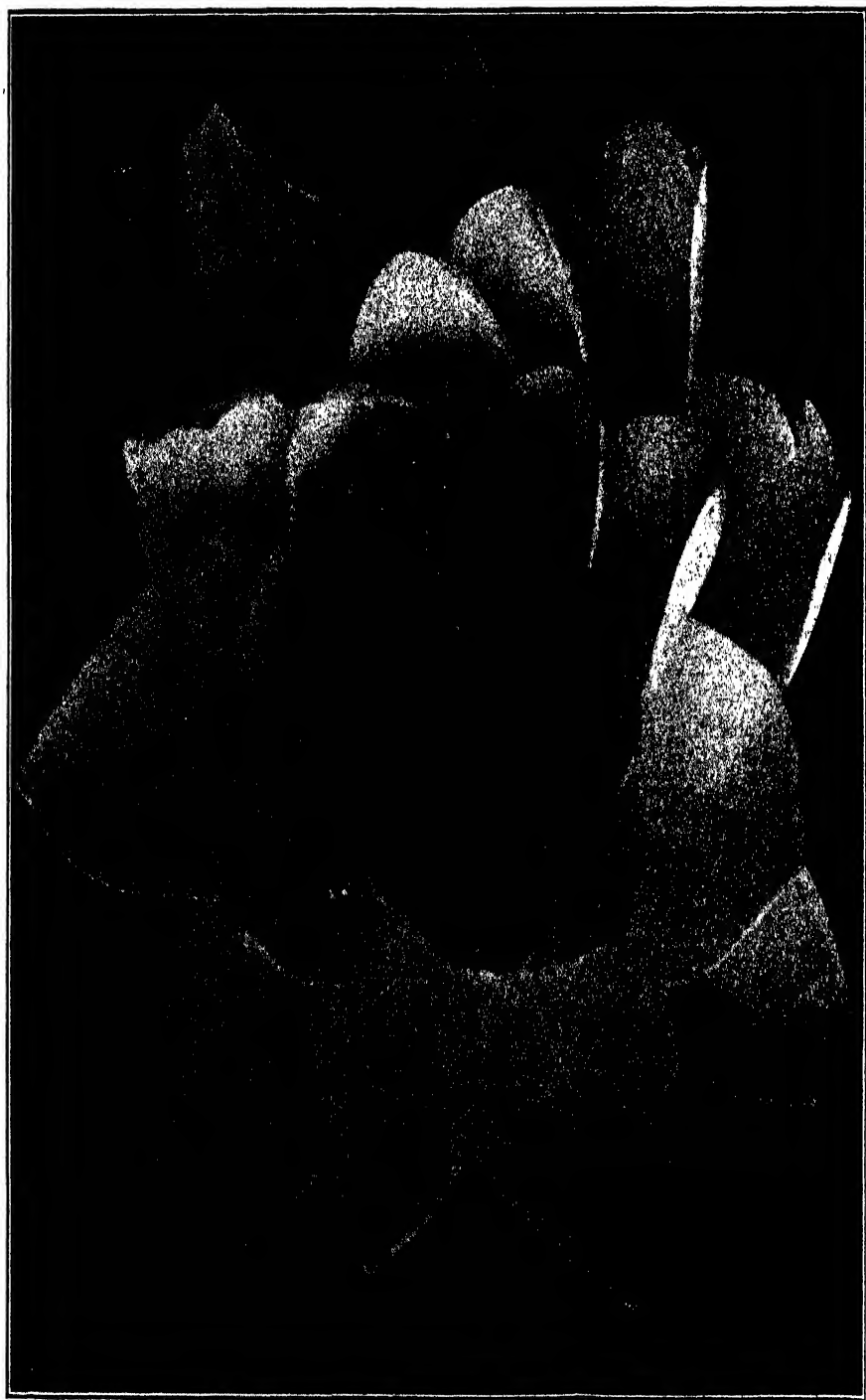


FIG. 125.—*NYMPHAEA GLADSTONIANA*. (*Gard. Illus.*) (p. cxlviii.)

see p. cxlviii.

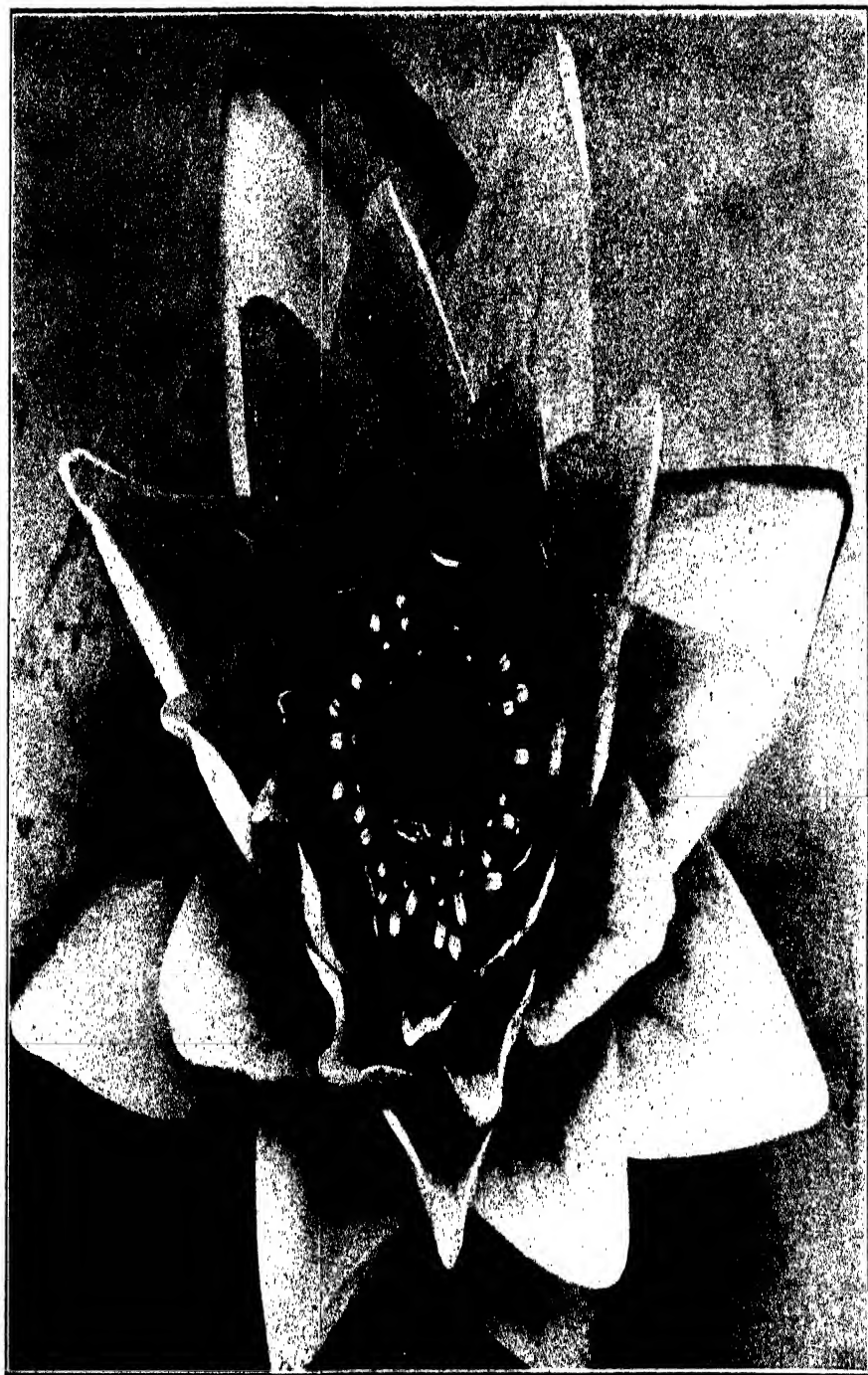


FIG. 126.—*NYMPHAEA* 'MRS. RICHMOND.' (*Gard. Illustr.*) (p. cxlix.)

immense size, and the foliage is exceptionally large. Perhaps the best white water lily at present in cultivation. (Fig. 125.)

To *Nymphaea* 'Mrs. Richmond' (votes, unanimous), from Leopold de Rothschild, Esq., C.V.O. (gr. Mr. J. Hudson, V.M.H.), Gunnersbury House, Acton. A rose-pink variety of great beauty. The flowers, which measure 8 inches across, are of good shape, and have a mass of golden-yellow stamens in the middle. The foliage is of medium size, and very dark green in colour. (Fig. 126.)

Other Exhibits.

F. Du Cane Godman, Esq., Horsham: *Erythrina Crista-galli*, from the open.

Guildford Hardy Plant Nursery, Guildford: hardy plants.

Mr. G. Kioyuni, Bessborough Gardens, S.W.: Japanese dwarf trees.

Earl of Lovclace, Leatherhead: double white Sweet Pea.

Mr. G. Reuthe, Keston: hardy plants.

Mr. Shoesmith, Woking: Dahlias.

Mr. A. Turner, Slough: Dahlias.

Messrs. Whitelegg & Page, Chislehurst: Pelargoniums.

ORCHID COMMITTEE.

MAY 9, 1911.

Mr. J. GURNEY FOWLER in the Chair, and twenty-one members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Sander, St. Albans, for Cattleyas and hybrids.

Silver Banksian Medal.

To Messrs. Stuart Low, for Dendrobiums, Cattleyas, etc.

To J. S. Moss, Esq., Bishop's Waltham, for hybrid Odontoglossums.

To Messrs. J. Cypher, Cheltenham, for a group.

First-class Certificate.

To *Odontoglossum* × *illustrissimum* var. 'Queen Mary' (*Lambauianum* × *ardentissimum*) (votes, unanimous), from W. Thompson, Esq., Walton Grange (gr. Mr. Stevens). Sepals and petals deep vinous purple, with slight white markings at the bases and margins of the segments. Lip white, marked with purple on the basal half.

Award of Merit.

To *Miltonia* × *Hyeana* (*Bleuana* × *vezillaria*) (votes, 14 for), from F. M. Ogilvie, Esq., Oxford (gr. Mr. Balmforth). Flowers closely resembling *M.* × *Bleuana*, tinged with rose-pink.

To *Odontioda* × *rosefieldiensis* (*C. Noezliana* × *O. triumphans*) (votes, 15 for), from de B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. Stables). Flowers of a uniform orange-scarlet. Lip whitish, tinged with rose, and with prominent yellow ridges at the base.

To *Odontoglossum* × *harvengtense* *Crawshayanum* (*crispum* × *triumphans*) (votes, unanimous), from de B. Crawshay, Esq. A home-raised form, very superior to the imported natural hybrids. Colour primrose-yellow, blotched with light brown.

Other Exhibits.

F. M. Ogilvie, Esq.: *Cattleya Mendelii alba*, and other rare orchids.

Francis Wellesley, Esq.: *Brassocattlaelia* × 'King Emperor' (*B.-l.* × *Digbyano-purpurata* × *L.-c.* × *Dominiana*).

Pantia Ralli, Esq.: *Cattleya intermedia alba*.

de B. Crawshay, Esq.: hybrid Odontoglossums.

Mr. E. V. Low: a group.

Messrs. McBean: a group.

R. Brooman White, Esq.: spikes of *Odontoglossum*.

Mrs. Norman Cookson: flowers of *Odontoglossum*.

Samuel Larkin, Esq.: *Lycaste gigantea*.

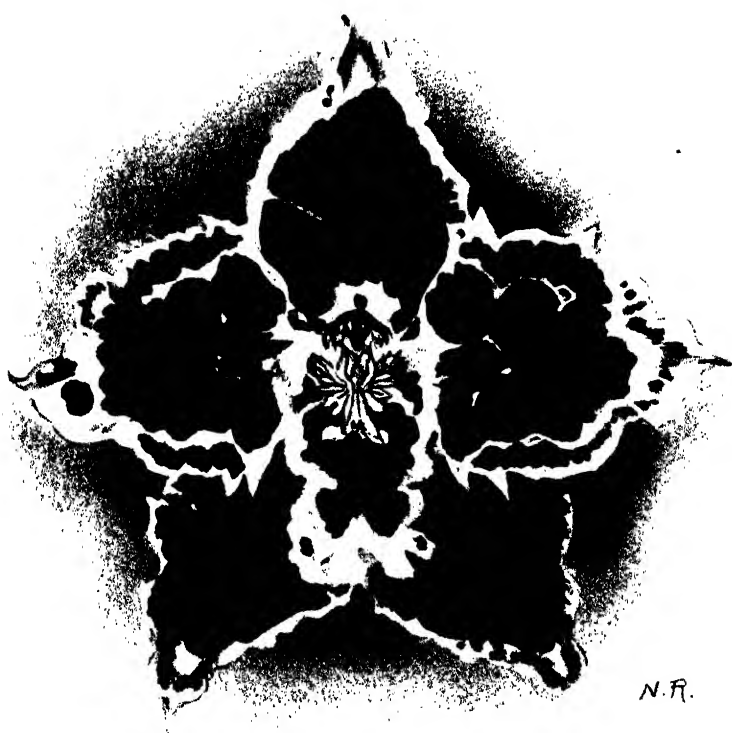


FIG. 127.- ODONTOGLOSSUM \times MIRM. THE DELL VARIETY.

(a. Toole p. cl.)



FIG. 128. *ONCIDIUM CORANEPHORUM* VAR. *MULLERI*.

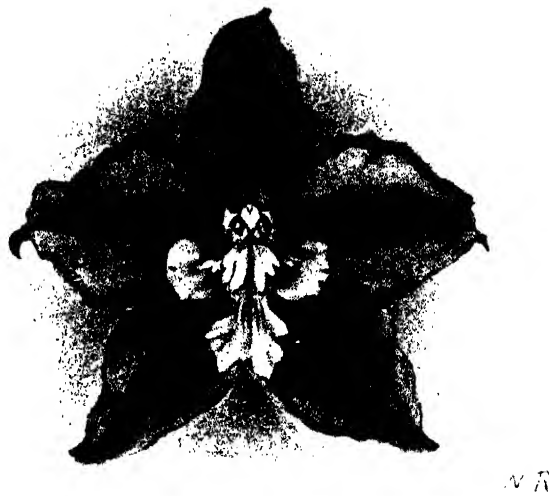


FIG. 129.—*ODONTIODA* × *BRADSHAWIAE*, GATTON PARK VARIETY.



FIG. 130 LAELIOCATTELYA \times MORNINGTONIAE. (*Gardeners' Magazine.*) (p. cli.)
(b. To face p. cli.)

ORCHID COMMITTEE, MAY 23, 24, 25, 1911.

TEMPLE SHOW.

Mr. HARRY J. VEITCH in the Chair, and twenty-four members present.

[For awards of cups and medals made by the Council after consultation with the Judges, see p. lxxxviii.]

Awards Recommended:—*First-class Certificate.*

To *Odontoglossum* × *mirum*, The Dell variety (*Wilckeanum* × *crispum*) (votes, unanimous), from Baron Bruno Schröder, The Dell, Englefield Green (gr. Mr. J. E. Shill). Flowers large and broad in all the segments; the prevailing colour deep chocolate purple with white margin and tips. (Fig. 127.)

To *Laeliocattleya* × *Morningtoniae* (*L.-c.* × *Pallas* × *L.-c.* × *Fascinator*) (votes, unanimous), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). A beautiful flower with white sepals and petals and rosy-mauve lip, with dark lines from the base, and a blush-white blotch in front. (Fig. 130.)

To *Odontioda* × 'Coronation' (parentage unrecorded) (votes, unanimous), from Monsieur Chas. Vuylsteke, Ghent. Flowers of the largest, the segments orange scarlet on the inner halves, blush-white beyond, with a rose margin.

To *Oncidium corynephorum* var. *Mulleri* (votes, 19 for, 1 against), from Messrs. Sander, St. Albans. A fine form of the species which obtained a **F.C.C.** October 24, 1905. Sepals and petals white, with slight rose marking. Lip broadly ovate, purple. (Fig. 128.)

To *Odontioda* × *Bradshawiae*, Gatton Park variety (*O. crispum* × *C. Noezliana*) (votes, 14 for, 1 against), from Sir Jeremiah Colman, Bart., V.M.H. Flowers large, wholly deep scarlet. (Fig. 129.)

Award of Merit.

To *Oncidium Claesii* (votes, 17 for), from Sir Jeremiah Colman, Bart., V.M.H. (gr. Mr. Collier). A singular species of the *O. superbiens* class, with trailing inflorescence bearing brownish flowers with purple lip.

To *Coelogyne* × *burfordiense* (*asperata* × *pandurata*) (votes, unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O. (gr. Mr. W. H. White). Nearest to *C. pandurata*. Sepals and petals greenish white; lip with a spiny black crest with some yellow markings.

To *Cattleya Mossiae* 'G. M. Hales' (votes, 16 for, 8 against), from Samuel Larkin, Esq., The Ridgways, Haslemere (gr. Mr. G. M. Hales). Flowers dark, resembling *C. Warneri*.

To *Laeliocattleya* × *Germania* (*L.-c.* × *Cappei* × *C. Mendeli*) (votes, unanimous), from Messrs. Charlesworth. A distinct and pretty hybrid, chrome yellow, with carmine-red front to the lip.

To *Odontoglossum* × *amabile* 'Empress of India' (*crispum* ×
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crispo-Harryanum) (votes, 9 for, 4 against), from Messrs. Sander. Flowers large, white tinged with rose and blotched on the inner parts with claret.

Cultural Commendation.

To Messrs. Charlesworth, for a fine specimen of *Odontoglossum hastilabium* 'Charlesworthii'.

Other Exhibits.

Monsieur Charles Vuylsteke: four hybrid *Odontoglossums*.

Messrs. James Veitch: rare hybrids, &c.

ORCHID COMMITTEE, JUNE 6, 1911.

Mr. J. GURNEY FOWLER in the Chair, and fifteen members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Charlesworth, for hybrid *Odontoglossums*, *Laeliocattleyas*, &c.

To Messrs. Sander, for fine forms of *Laeliocattleya* × *Canhamiana* and other orchids.

To Messrs. McBean, for *Odontoglossums* and *Cattleyas*.

To Messrs. Hassall, for *Cattleya Mossiae*, including about twenty white varieties.

To Messrs. Stuart Low, for a group.

Silver Banksian Medal.

To Samuel Larkin, Esq. (gr. Mr. Hales), for a group.

To Mr. E. V. Low, for a group.

Bronze Banksian Medal.

To de B. Crawshay, Esq., for hybrids.

Award of Merit.

To *Cattleya Mossiae* 'Aureola' (votes, unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O. (gr. Mr. W. H. White). A large and distinct blush-white form with orange centre to the lip, the base of which has some pale purple markings.

To *Oncidioida* × 'Cybele' (*Oncidium sarcodes* × *Cochlioda Noezliana*) (votes, unanimous), from Messrs. Charlesworth. A pretty bigeneric hybrid with flowers on a branched inflorescence, equal to those of *O. sarcodes*, yellow tinged and spotted light scarlet.

Other Exhibits.

Sir Trevor Lawrence, Bart., K.C.V.O.: *Laeliocattleya* × *Fascinator-Mossiae*.

J. Gurney Fowler, Esq.: *Odontioda* × *Bradshawiae*, Cookson's variety, 13 flowers.

Francis Wellesley, Esq.: *Laeliocattleya* × *Farrantiae* (*L. purpurata* × *L.-c.* × 'Pallas'); and *Cattleya Mossiae* 'King Emperor.'



FIG. 131.—*LAELIOCATTLEYA* × *SYLVIA*. (p. clii.)

(To face p. clii.)

Messrs. Armstrong & Brown: a group.

Mr. Flory, Tracy's Nursery: *Cattleya Mossiae Floryae*.

The Liverpool Orchid Company: *Laeliocattleya* × *Cowanii*.

Mr. John Robson: *Odontoglossums*.

ORCHID COMMITTEE, JUNE 20, 1911.

Mr. J. GURNEY FOWLER in the Chair, and twenty members present.

Awards Recommended:—

Silver Banksian Medal.

To E. R. Ashton, Esq., Tunbridge Wells (gr. Mr. Young), for *Laeliocattleyas*, &c.

To Messrs. Sander, for hybrids and rare species.

To Messrs. Stuart Low, for a group.

First-class Certificate.

To *Odontoglossum* × *illustré* var. 'Europa' (*Vuykstekei* × *ardentissimum*) (votes, unanimous), from J. Gurney Fowler, Esq. (gr. Mr. J. Davis). Flowers of good shape, reddish violet with white margins to the segments, and white front to the lip.

Award of Merit.

To *Odontioda* × *rosefeldiensis* *Crawshayana* (*O. triumphans* × *C. Noezliana*) (votes, 12 for, 4 against), from de B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. Stables). A larger form of the hybrid which received an **A.M.** May 9, 1911.

Other Exhibits.

Sir Jeremiah Colman, Bart., V.M.H.: rare Orchids.

de B. Crawshay, Esq.: two hybrid *Odontoglossums*.

The Baroness von Ernsthause: *Brassia verrucosa*.

Messrs. Charlesworth: hybrids.

Mr. E. V. Low: white *Cattleyas*.

Messrs. McBean: *Odontoglossums*.

Messrs. Armstrong & Brown: *Masdevallia Harryana splendens*.

Mr. S. Flory, Tracy's Nursery: *Dendrobium ochreatum* var. *luteum*.

ORCHID COMMITTEE, JULY 4, 1911.

AT OLYMPIA.

Mr. HARRY J. VEITCH in the Chair, and twenty-six members present.

[For awards of cups and medals made by the Council after consultation with the Judges, see p. xciv.]

Awards Recommended:—

First-class Certificate.

To *Laeliocattleya* × 'Sylvia' (*L.-c.* × 'Ascania' × *L.-c.* × 'Hippolyta Phoebe' (votes, 15 for, 2 against), from Messrs. Charlesworth.

L.-c. × 'Ascania' (*L. xanthina* × *C. Trianae*) and *L.-c.* × 'Hippolyta' (*L. cinnabarina* × *C. Mossiae*) enter into the composition of this hybrid. Forms of *C. labiata* being one of the parents on each side secures good size and form in the hybrid. The colour is domin-

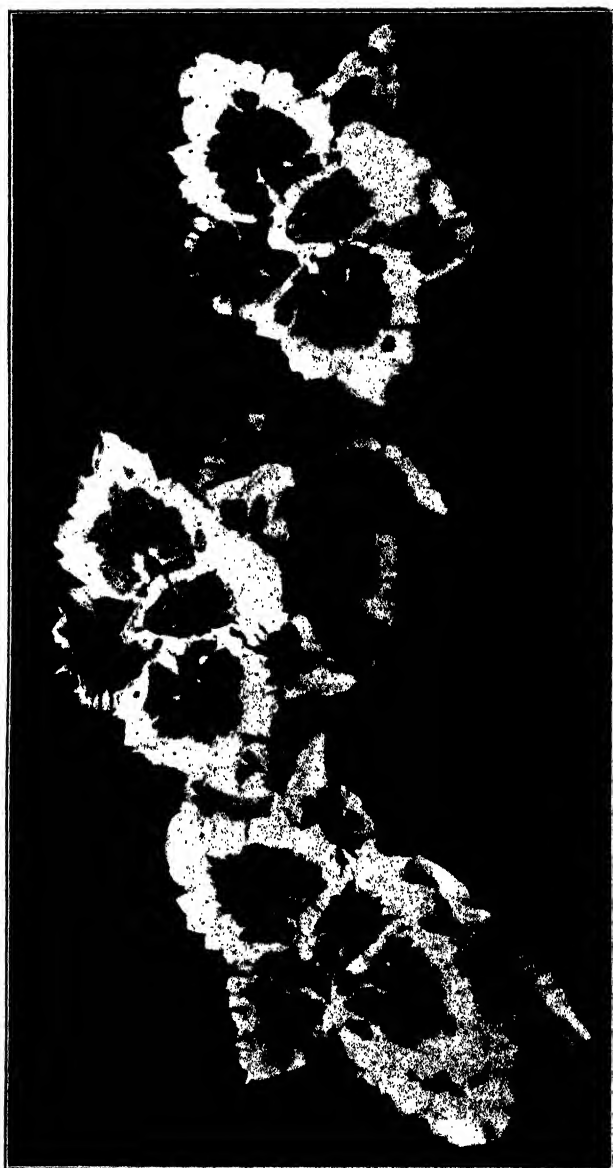


FIG. 132.—*ODONTOGLOSSUM* × *ARDENTISSIMUM* 'QUEEN MARY.' (Sander.)

ated by *L. xanthina* and *L. cinnabarina*. Sepals and petals bright yellow: lip, ruby crimson with yellow margin. (Fig. 131.)

To *Odontoglossum* × *ardentissimum* 'Queen Mary' (*O. Pescatorei* × *O. crispum* 'F. K. Sander') (votes, unanimous), from Messrs. Sander. Flowers white, heavily blotched with violet. (Fig. 132.)

Award of Merit.

To *Odontoglossum* × *erimium* 'King George' (*ardentissimum* × *crispum*) (votes, unanimous), from Messrs. Sander. A fine hybrid of a deep claret-red colour, with narrow white margin, and white front to the lip.

To *Odontoglossum* × *amabile* 'The Queen' (*crispum* × *crispoharryanum*) (votes, unanimous), from Messrs. Sander. A large, white wax-like flower, with some dark purple markings.

To *Odontioda* × *Bradshawiae*, Sander's variety (*O. crispum* × *C. Noezliana*) (votes, unanimous), from Messrs. Sander. Flowers of good size and form; orange scarlet, with broad whitish margin tinged with lilac.

To *Laeliocattleya* × *Martinellii* 'King George' (*L. tenebrosa* × *C. Mossiae*) (votes, unanimous), from Messrs. Charlesworth. Flowers rosy lilac, with deep claret lip.

To *Odontoglossum* × 'Olympia' (parentage unrecorded) (votes, 11 for, 2 against), from Messrs. Charlesworth. A very large white flower blotched with cinnamon brown.

To *Cattleya Mossiae* 'Queen Mary' (votes, unanimous), from Messrs. Mansell & Hatcher, Rawdon, Leeds. Flowers pure white, with slight pink markings on the lip.

Cultural Commendation.

To Mr. J. Davis, gr. to J. Gurney Fowler, Esq., for *Oncidium macranthum*, with over 300 flowers.

To Mr. J. Davis, for *Anguloa Cliftonii*, with six large flowers.

To Mr. G. E. Day, gr. to H. S. Goodson, Esq., for *Cattleya Mossiae Wageri*, with thirteen blooms.

Other Exhibits.

Sir Jeremiah Colman, Bart. (gr. Mr. Collier): rare species.

ORCHID COMMITTEE, JULY 18, 1911.

MR. J. GURNEY FOWLER in the Chair, and sixteen members present.

Awards Recommended:—*Silver Banksian Medal.*

To Messrs. Sander, for a group.

To Messrs. Stuart Low, for a group.

First-class Certificate.

To *Dendrobium Victoria Regina* (votes, 15 for, 1 against), from Sir Trevor Lawrence, Bart., K.C.V.O., Burford (gr. Mr. W. H. White). The fine blue *Dendrobium* of the Philippine Isles which received an **A.M.** August 10, 1897.

Cultural Commendation.

To Mr. W. H. White, orchid grower to Sir Trevor Lawrence, Bart., K.C.V.O., for a fine specimen of *Dendrobium Victoria Regina*, with

thirty spikes of flowers, which had been grown in the *Odontoglossum* house.

Other Exhibits.

Baron Bruno Schröder: *Laeliocattleya* × *elegans Broomeana*

Sir Trevor Lawrence: *Dendrobium Annae* and *D. mutabile*.

de B. Crawshay, Esq.: hybrid *Odontoglossums*.

F. J. Hanbury, Esq.: *Cattleya* × 'Miss Harris.'

Messrs. Charlesworth: rare Orchids.

Messrs. McBean: a group.

ORCHID COMMITTEE, AUGUST 1, 1911.

Sir JEREMIAH COLMAN, Bart., V.M.H., in the Chair, and fourteen members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Mrs. Bischoffsheim, The Warren House, Stanmore (gr. Mr. Taylor), for a very fine group of *Disa grandiflora* bearing 120 spikes.

Silver Flora Medal.

To H. S. Goodson, Esq., Putney (gr. Mr. G. E. Day), for *Odontodas*, *Cattleyas*, &c.

Silver Banksian Medal.

To Messrs. Charlesworth, for hybrids and rare species.

To Messrs. Sander, for *Cattleyas*, &c.

To W. James, Esq., Chichester (gr. Mr. W. H. Smith), for *Disa grandiflora*.

Award of Merit.

To *Catasetum Cliftonii* (votes, unanimous), shown by Sir Trevor Lawrence, Bart., and Sir Jeremiah Colman, Bart. A very remarkable species showing much variation, some of the forms in general appearance resembling *C. Bungerothii*, from which it differs mainly in the extraordinary large orange-coloured callus at the base of the lip, which in some forms is distinctly trilobed. Sepals and petals, greenish or yellow; lip, white or yellow.

Cultural Commendation.

To Mr. H. G. Alexander, orchid grower to Lieut.-Col. Sir George L. Holford, K.C.V.O., for a massive plant of *Phalaenopsis violacea*, with leaves one foot long and eight inches broad, and bearing two spikes.

Other Exhibits.

Sir Trevor Lawrence, Bart., K.C.V.O.: rare Orchids.

Baron Bruno Schröder: *Mormodes luxatum* and *Laeliocattleya* × *elegans Broomeana*.



FIG. 133.—CATTLEYA X RHODA ILLUMINATA. (p. clvii.)

(To face p. clvi.)

Sir Jeremiah Colman, Bart., V.M.H.: rare Orchids.

E. H. Davidson, Esq.: hybrid Cattleyas.

The Rev. J. Crombleholme: *Cypripedium* × *Ossulstonii*, Crombleholme's variety.

R. G. Thwaites, Esq.: hybrids.

Messrs. Armstrong & Brown: hybrids.

Mr. E. V. Low: a group.

ORCHID COMMITTEE, AUGUST 15, 1911.

Mr. WILLIAM BOLTON in the Chair, and four members present.

Awards Recommended: --

First-class Certificate.

To *Cattleya* × 'Rhoda' *illuminata* (*Iris* × *Hardyana*) (votes, unanimous), from Messrs. Charlesworth, Hayward's Heath. A fine large-flowered Cattleya, with sepals and petals bright yellow tinged and veined with rose, the broad, crimped labellum being claret-crimson with an orange base. (Fig. 133.)

Award of Merit.

To *Trichopilia Lehmannii* (votes, unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O. (gr. Mr. W. H. White). Allied to *Trichopilia (Pilumna) fragrans*. Sepals and petals equal, narrow, undulate, silver white. Lip large, pure white, with an orange disc. Very fragrant.

To *Gongora leucochila* (votes, unanimous), from Messrs. Charlesworth. Lip large, fleshy, pure white, with a large chocolate blotch on each side. Inside of the sepals white, the reverse purple.

To *Sophrolaeliocattleya* × *Goodsonii* (*S.-l.* × *heatonensis* × *L.-c.* × *luminosa*) (votes, unanimous), from H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. G. E. Day). Flowers of good size, two to four on a scape, bronzy-rose, with bright claret-coloured lip.

Other Exhibits.

Sir Trevor Lawrence, Bart., K.C.V.O., sent a stout spike of *Lissochilus giganteus*, twelve feet in length, and bearing thirty-six rose-coloured flowers.

Sir Jeremiah Colman, Bart., V.M.H., showed *Odontioda* × *Graireana*.

J. Gurney Fowler, Esq.: *Cattleya* × 'Rhoda,' Fowler's variety.

Francis Wellesley, Esq.: *Laeliocattleya* × 'Lady Chance.'

Messrs. Charlesworth: rare Orchids.

Messrs. Sander: three new hybrids.

Messrs. Stuart Low: *Cattleya* × *Thurgoodiana*.

ORCHID COMMITTEE, AUGUST 29, 1911.

Mr. HARRY J. VEITCH in the Chair, and thirteen members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To his Grace the Duke of Marlborough (gr. Mr. Hunter), for a fine group of *Vanda coerulea*.

Silver Flora Medal.

To Messrs. Charlesworth, for a group of new hybrids, and rare species.

Silver Banksian Medal.

To Messrs. Stuart Low, for a group of hybrid Cattleyas, and showy species.

To Messrs. Hassall, for a group.

To Mr. E. V. Low, for a group.

Award of Merit.

To *Houlletia Wallisii* (votes, unanimous), from Messrs. Charlesworth. A rare species with a decumbent inflorescence of large wax-like pale yellow flowers spotted with purple on the inside. (Fig. 134.)

Cultural Commendation.

To Messrs. Charlesworth, for a fine specimen of *Aerides Sanderianum* with four spikes.

Other Exhibits.

Sir Trevor Lawrence, Bart., K.C.V.O.: *Dendrobium undulatum viride*.

R. G. Thwaites, Esq.: hybrids.

Messrs. Sander: *Catasetum reflexum*.

Messrs. Jas. Veitch: *Laeliocattleya* × *Dominiana* of their best old type.

Monsieur Henri Graire, Amiens: *Adioda* × 'St. Fuscien' (*Adi aurantiaca* × *Cochlioda Noezliana*). (See p. cxix.)



FIG. 134.—HOUULETTIA WALLISII. (*Gardener's Chronicle*,) (p. clviii.)

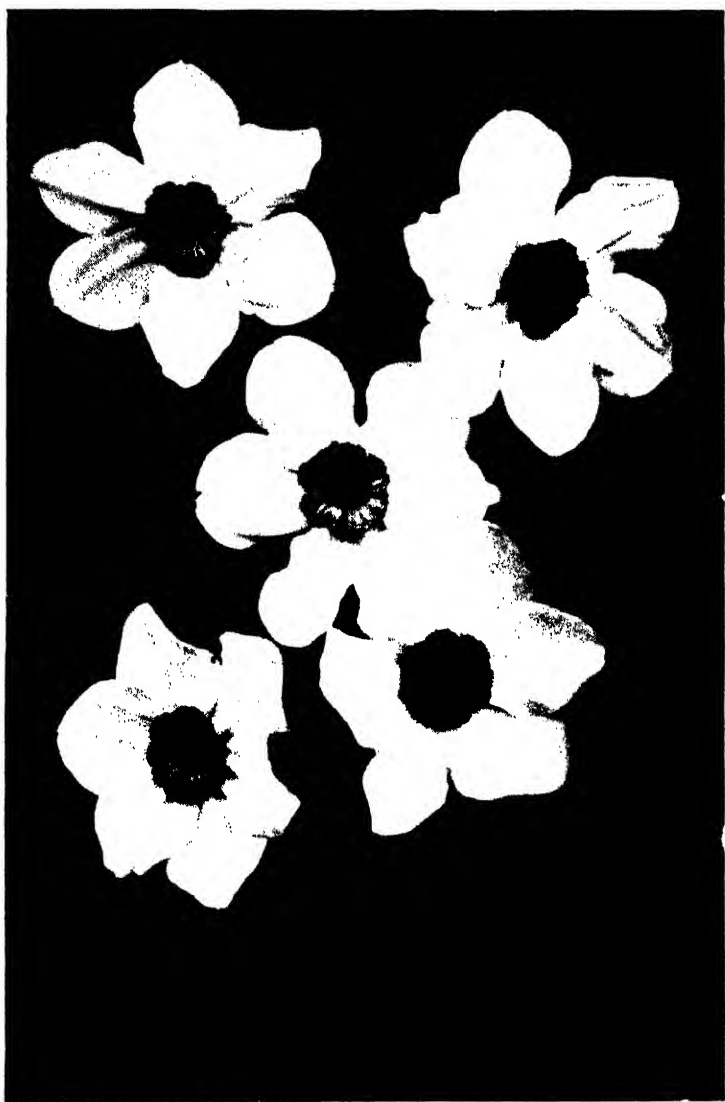


FIG. 135. NARCISSUS 'MISS WILLMOTT.' (*The Garden.*) (p. clxi.)

NARCISSUS AND TULIP COMMITTEE.

MARCH 14, 1911.

Mr. E. A. BOWLES in the Chair, and twenty-three members present, with Mr. W. B. Cranfield as visitor.

The thanks of the Committee were presented to Mr. H. B. May for his courteous services as Chairman for many years, and a cordial welcome was extended to Mr. E. A. Bowles, the new Chairman.

A vote of condolence and sympathy was passed to the members of the family of the late Mr. James Walker, one of the original members of the Committee, and one held in the highest esteem.

Mr. Cranfield explained his position in connexion with the proposal already on foot for the formation of a National Daffodil Society, and expressed his willingness to let the matter remain in abeyance pending any similar movement on the part of the Narcissus Committee and the Council of the Royal Horticultural Society. The Hon. John Boscawen said the Council would be prepared to entertain proposals from the Committee for a Spring Show, a Year Book, and the subdivision of the Committee for various purposes.

The following resolution was adopted for presentation to the Council:—

“The Narcissus Committee beg the Council to grant it power to hold a two-days' show in mid-April; to issue a Year Book annually (through the Council); to issue a Schedule of Prizes (Committee to find the cash prizes); and to divide itself into Sub-Committees for special purposes.”

Awards Recommended:—*Silver-gilt Banksian Medal.*

To Messrs. Cartwright and Goodwin, Kidderminster, for Daffodils.

To Messrs. Cuthbert, Southgate, for Tulips.

Silver Flora Medal.

To Messrs. Barr, Covent Garden, for Daffodils.

To Mr. Christopher Bourne, Simpson, Bletchley, for Daffodils.

Silver Banksian Medal.

To Messrs. R. H. Bath, Wisbech, for Daffodils and Tulips.

To Messrs. J. R. Pearson, Lowdham, Notts, for Daffodils.

Bronze Flora Medal.

To Messrs. Robert Sydenham, Birmingham, for Daffodils.

Award of Merit.

To Tulip 'Yellow Murillo' (votes, 15 for), a large, very double, yellow variety, from Mr. W. Profitlich, Twickenham.

NARCISSUS AND TULIP COMMITTEE, MARCH 28, 1911.

Mr. E. A. BOWLES in the Chair, and twenty-three members present.

Mr. H. B. May personally acknowledged the thanks accorded him for his services as Chairman of the Narcissus Committee in previous years.

The Hon. Secretary submitted the following reply to the resolution sent up to the Council from the previous meeting:—

“The Council, having considered the Resolution sent up to them from the Narcissus Committee, are willing—(1) To hold a two-days’ Daffodil Show in April. (2) To issue a Year Book if the Committee supply sufficient material for the same. (3) To issue a Schedule for the Show after receiving recommendations from the Committee thereupon. (4) The Council consider all Committees competent to subdivide themselves into Sub-Committees for special and topical purposes.”

It was agreed that all particulars relative to a Daffodil or Tulip submitted for Award or Certificate must be inscribed on the entry form.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Cartwright and Goodwin, Kidderminster, for Daffodils.

Silver Flora Medal.

To Messrs. Barr, Covent Garden, for Daffodils.

To Messrs. R. H. Bath, Wisbech, for Daffodils and Tulips.

To Mr. Alex. Wilson, Bridgwater, for new Daffodils.

Silver Banksian Medal.

To Mr. J. Cooper, Lissadell Bulb Farm, Sligo, for Daffodils.

NARCISSUS AND TULIP COMMITTEE, APRIL 11, 1911.

Mr. E. A. BOWLES in the Chair, and eighteen members present.

Mr. A. Wilson and Mr. C. Dawson gave notice of the following motion for the meeting of May 9:—“That five flowers shall be submitted for an Award of Merit, instead of eight as heretofore.”

It was agreed that on May 9 a Sub-Committee be elected to prepare a list of Tulip names.

Awards Recommended:—

Silver-gilt Flora Medal.

To Miss F. W. Currey, Lismore, Ireland, for Daffodils.

To Mr. Alex. Wilson, Bridgwater, for new Daffodils.

To Messrs. Barr, Covent Garden, for Daffodils.



FIG. 136.—NARCISSUS (1) 'QUEEN OF HEARTS,' (2) 'SOCRATES,' (3) 'MISS WILLMOTT.' (pp. clxi., clxii.)

(To face p. clx.)

Silver Flora Medal.

To Messrs. Cartwright and Goodwin, Kidderminster, for Daffodils.

To Mr. J. Cooper, Lissadell Bulb Farm, Sligo, for Daffodils.

Silver Banksian Medal.

To Messrs. R. H. Bath, Wisbech, for Daffodils and Tulips.

To Mr. F. Herbert Chapman, Rye, for Daffodils, mostly new varieties.

To Messrs. Robert Sydenham, Birmingham, for Daffodils.

To Messrs. Baylor Hartland, Cork, for Daffodils.

NARCISSUS AND TULIP COMMITTEE, APRIL 25, 1911.

Mr. E. A. Bowles in the Chair, and twenty-one members present.

The Chairman reported the election of the Rev. G. H. Engleheart and Messrs. P. R. Barr, W. B. Cranfield, R. Sydenham, P. D. Williams, and W. T. Ware, with himself and the Hon. Secretary, to form the Schedule Sub-Committee for the Spring Show; and that the Rev. G. H. Engleheart, Rev. Canon Fowler, Rev. J. Jacob, Miss Willmott, Mr. J. T. Bennett Pöe, with himself and the Hon. Secretary, had been appointed to act as the new Publications Sub-Committee.

Awards Recommended :*Silver-gilt Flora Medal.*

To Messrs. Barr, Covent Garden, for Daffodils and Tulips.

Silver-gilt Banksian Medal.

To Mr. Christopher Bourne, Simpson, Bletchley, for Daffodils.

Silver Banksian Medal.

To the Rev. G. P. Haydon, Westbere, Canterbury, for new Daffodils.

To A. W. Merry, Esq. (gr. Mr. G. Kelf), Welwyn, for Daffodils.

To Messrs. R. H. Bath, Wisbech, for Daffodils and Tulips.

Bronze Banksian Medal.

To Mr. Frank Lilley, Guernsey, for Daffodils and Tulips.

First-class Certificate.

To Narcissus ' Miss Willmott ' (votes, 19 for, 1 against), a splendid variety, with broad white perianth segments, and wide, yellow, red-edged cup, granted an **A.M.** on April 20, 1907; from Messrs. Walter T. Ware, Inglescombe, Bath. (Figs. 135, 136.)

Award of Merit.

To Narcissus ' Socrates ' (votes, 15 for), a *poeticus* variety, with fine white perianth and an orange, red rimmed crown, from Messrs. Barr, Covent Garden. (Fig. 136.)

To Narcissus 'Queen of Hearts' (votes, 18 for), a beautiful new *incomparabilis* variety, with rounded, creamy white perianth segments and an orange cup, from Mr. Christopher Bourne, Simpson, Bletchley. (Fig. 136.)

NARCISSUS AND TULIP COMMITTEE, MAY 9, 1911.

Mr. E. A. BOWLES in the Chair, and seventeen members present.

In accordance with notice of motion the following resolution was discussed:—"That five flowers shall be submitted for an Award of Merit, instead of eight as heretofore," and was unanimously agreed to.

The Rev. J. Jacob and Messrs. P. R. Barr, W. T. Ware, R. Wallace, G. Leak, and the Hon. Secretary, were elected to form the Sub-Committee to prepare a list of Tulip names.

Awards Recommended :

Silver-gilt Flora Medal.

To Messrs. R. Wallace, Colchester, for Tulips.

To Messrs. Hogg and Robertson, Mary Street, Dublin, for Tulips.

Silver-gilt Banksian Medal.

To Messrs. Alex. Dickson, Newtownards, Ireland, for Tulips.

To Messrs. Barr, Covent Garden, for Tulips.

Silver Flora Medal.

To Messrs. R. H. Bath, Wisbech, for Tulips.

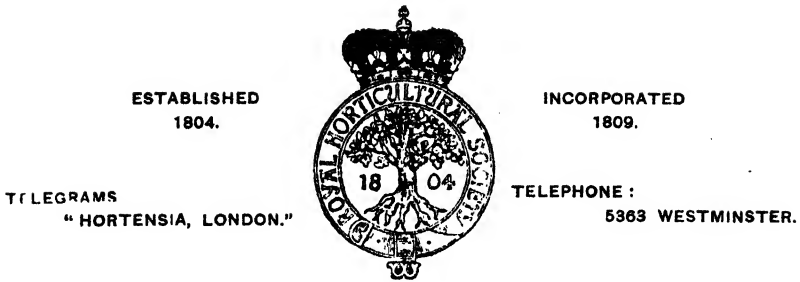
To Messrs. Sutton, Reading, for Tulips.

Silver Banksian Medal.

To Messrs. Robert Sydenham, Birmingham, for late Daffodils.

Award of Merit.

To Narcissus 'Sonata' (votes, 10 for, 5 against), a *poeticus* variety, with rounded, white segments and deep red crown, from Mr. F. Herbert Chapman, Rye.



ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W.

NOTICES TO FELLOWS.

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2. Letters.
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4. Journals Wanted.
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8. List of Fellows.
9. New Fellows.
10. An Appeal.
11. Lindley Library.
12. The Society's Gardens at Wisley.
13. Rock Garden at Wisley.
14. New Bothy at Wisley.
15. Trials at Wisley in 1912-13.
16. The Wisley Research Station.
17. Students at Wisley.
18. Distribution of Surplus Plants.
19. Exhibitions, Meetings, and Lectures in 1911.
20. Dates fixed for 1912.
21. British Fruit and Vegetables.
22. Challenge Cups for Vegetables.
23. Shows of Daffodils and Orchids.
24. Spring Show of Forced Bulbs.
25. Examinations, 1912.
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28. Affiliation of Local Societies.
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30. Alterations in Rules for Judging--1911 Code.
31. Spraying of Fruit Trees.
32. Varieties of Fruits.
33. Plants Certificated.
34. Recognition of Diligent Interest in Plants.
35. MS. for Journal.
36. Advertisements.
37. Shirley Poppies.
38. Anonymous Gift.
39. International Horticultural Exhibition, May 22-30, 1912.

1. GENERAL.

Notices to Fellows are always added at the end of each number of the JOURNAL, immediately preceding the Advertisements, and also at the beginning both of the "Book of Arrangements" and of the "Report of the Council." Fellows are particularly requested to consult these Notices, as it would often save them and the Secretary much needless correspondence.

2. LETTERS.

All letters on all subjects should be addressed—The Secretary, Royal Horticultural Hall, Vincent Square, Westminster, S.W.

3. TELEPHONE AND TELEGRAMS.

Telephone Number : **5363 WESTMINSTER.**

"**HORTENSIA, LONDON,**" is sufficient address for telegrams.

4. JOURNALS WANTED.

The Secretary would be greatly obliged by the return to the Society of ANY NUMBERS of the JOURNAL which may be of no further use to Fellows. Complete sets are occasionally applied for, but, at the present moment, not even one can be supplied owing to the stock of the following being exhausted :—

VOLUME V. Part 1.

VOLUME XIII. Part 1.

VOLUME X.

VOLUME XIV.

These are therefore particularly asked for.

5. SUBSCRIPTIONS.

All Subscriptions fall due on January 1st of each year. To avoid the inconvenience of remembering this, Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments ; or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1st. It may be a week or more before the Tickets reach the Fellows, owing to the very large number (over 20,000) to be despatched within the first month of the year. Fellows who have not already given an order on their bankers for the payment of their subscriptions each year are requested to do so, as this method of payment is preferred, and saves the Fellows considerable trouble. Fellows whose subscriptions remain unpaid are debarred from all the privileges of the Society ; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

In paying their subscriptions, Fellows often make the mistake of drawing their cheques for Pounds instead of for Guineas. Kindly note that in all cases it is Guineas, and not Pounds. Cheques and Postal Orders should be made payable to "The Royal Horticultural Society" and crossed "London County and Westminster Bank, Victoria Branch S.W."

6. FORM OF BEQUEST.

I give and bequeath to the Treasurer for the time being of the Royal Horticultural Society, London, the sum of £ . . . , to be paid out of such part of my personal estate as I can lawfully charge with the payment of such legacy, and to be paid free of legacy duty, within six months of my decease ; the receipt of such Treasurer to be a sufficient discharge for the same. And I declare that the said legacy shall be applied towards [the general purposes of the Society].*

7. PRIVILEGES OF CHEMICAL ANALYSIS.

Instructions are contained at page 80 in the "Book of Arrangements," 1911.

* Any special directions or conditions which the testator may wish to be attached to the bequest may be substituted for the words in brackets.

8. LIST OF FELLOWS.

A list of all the Fellows of the Society is sent out in January. Fellows are requested to look at their own names in it, and if in any way these are incorrect, or the address insufficient, they are requested to inform the Secretary at once. Forms of Nomination, and of the Privileges of Fellows, are bound in with every number of the JOURNAL (Advt. pp. 82, 83) and the "Book of Arrangements."

9. NEW FELLOWS.

The President and Council fully appreciate how much the prosperity of the Society and its present large number of Fellows are due to the efforts of Fellows to enlist the sympathy of their friends; and the steady advance during recent years indicates the increasing recognition of the Society's work and usefulness. But it must not be supposed that a maximum has yet been reached. There is ample room for a great increase of Fellows, especially in America and the Colonies.

10. AN APPEAL.

What has been accomplished for the Society since 1887 is largely due to the unwearied assistance afforded by a small proportion of the Fellows; but as all belong to the same Society, so it behoves each one to do what he or she can to further its interests, especially by:—

1. Increasing the number of Fellows.
2. Helping to swell the General Prize Fund started by Mr. A. W. Sutton, V.M.H., for providing Prizes for the Students at Wisley.
3. Providing lectures with lantern slides.
4. Presenting books to fill the gaps in the Library both at Vincent Square and at Wisley.
5. Sending new and rare Plants and Seeds for the Garden and surplus Roots for distribution to the Fellows.
6. Sending Plants for the *New Rock Garden* at Wisley.

Thus there is plenty for all to do according to their individual liking: personal effort, money, plants, books, are all alike needed. The Secretary asks those who read these lines to help in the ways above indicated.

Since this notice last appeared, the following gifts have been received:—About 220 volumes from the late Mr. W. E. Gumbleton's library; an autograph steel engraving of a portrait of William McNab of Edinburgh, from Mr. Chas. Ross, V.M.H.; a collection of fern fronds sent by Mr. A. E. Graham Lawrence of S. Africa.

11. LINDLEY LIBRARY.

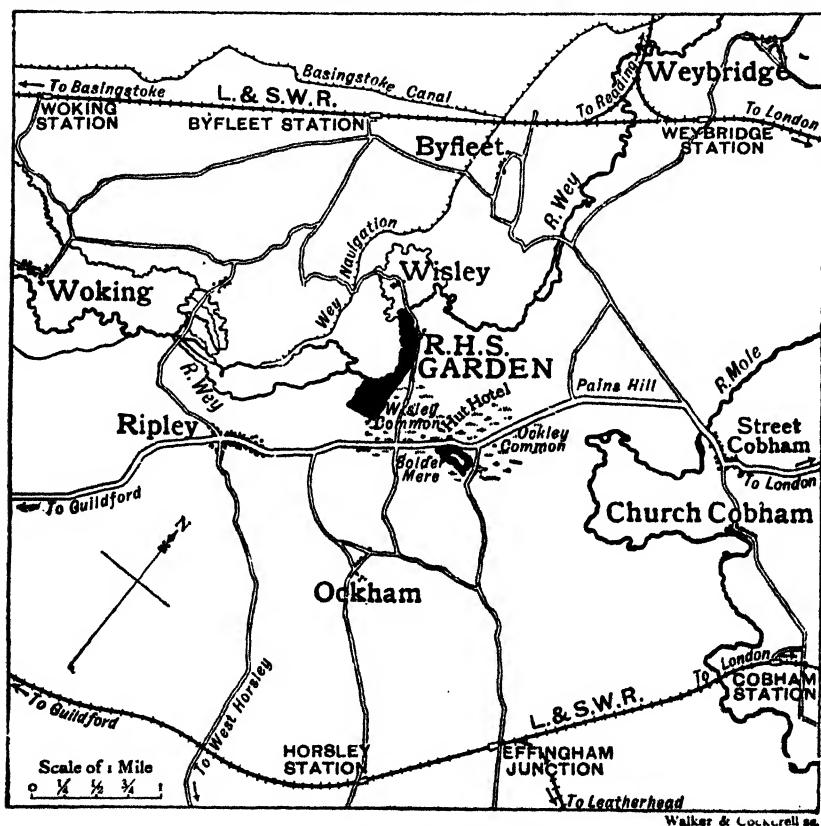
The Society acting in and through its Council, having now become sole trustee of the Lindley Library, Fellows and friends of the R.H.S. have the encouragement of knowing that their gifts to the Library can never be lost to the Society, but are attached to it in perpetuity. It

should now be the aim of all to make the Library far more perfect and complete than it is at present. Gifts of books, old or new, will be gratefully accepted.

12. THE SOCIETY'S GARDENS AT WISLEY.

The Gardens are open daily to Fellows and others showing Fellows' Transferable Tickets, from 9 A.M. till sunset, except on Sundays, Good Friday, Christmas Day, and Exhibition Days. Each Fellow's Ticket admits three to the Gardens. The Public are not admitted.

The Gardens, situated at Wisley (about 2 miles from Ripley, in Surrey), are about 8 miles from Byfleet, $8\frac{1}{2}$ miles from Horsley, and $5\frac{1}{2}$ miles from Weybridge, all stations on the South-Western Railway, with frequent trains from Waterloo and Clapham Junction. Carriages to convey four persons can be obtained by writing to Mr. D. White, fly proprietor, Ripley, Surrey; the charge being, to and from Weybridge



POSITION OF THE SOCIETY'S GARDENS.

waiting two hours at the Gardens, 8s.; or waiting three hours, 10s.; or to and from Horsley, 7s.; Effingham Junction, 7s.; Byfleet, 7s. Visitors should in all cases be careful to state the trains they intend to arrive by and leave by. Carriages can also be obtained at Weybridge for 8s. by writing to Mr. Trembling, New Road, Weybridge. Excellent

accommodation and refreshments can be had at the Hut Hotel, close to the Gardens, and also at the Hautboy at Ockham.

The motor route from London to Wisley will be found in the "Book of Arrangements," p. 118.

13. ROCK GARDEN AT WISLEY.

In consequence of the rapidly increasing interest taken in what are popularly called "Alpine Plants," "Alpines," or "Rock Plants," the Council have constructed a Rock Garden at Wisley on a somewhat extensive scale. The idea is to obtain the best possible positions and soils for the different plants to grow in, the growth and well-being of the plants being considered to be of even greater importance than the artistic effect of the rockwork. In a Horticultural Society's Garden every single detail should teach something, so that Fellows visiting it may be able to take away an idea of how best to do this or that or where best to plant this or that. The construction of the Rock Garden is completed, and the planting is proceeding, but it will be two, or possibly three, years or more before the plants on it can be seen at their best.

14. NEW BOTHY AT WISLEY.

The Council have always been anxious to promote the welfare of their gardeners, and with this object in view they have recently completed a new bothy, which they hope may prove of use far and wide as establishing the desirable *via media* between extravagance on the one hand and disregard of the men's comfort on the other. It may well serve as a model for the construction of bothies elsewhere.

15. TRIALS AT WISLEY IN 1912-13.

The Special Regulations for the direction of Trial Sub-Committees will be found on p. 33, Book of Arrangements.

N.B.—Everything sent for trial *must be named*, and the name and address of the sender attached.

Fruit.

Strawberries, Autumn Fruiting.—20 runners of each.

Melons.—Not less than six seeds of each in February.

Fruit berries.—Three plants of each by February. Strawberries, Raspberries, Gooseberries, Currants excluded.

Flowers.

Cape Pelargoniums.—Two cuttings of each (rooted or otherwise) as soon as possible. See next page.

Violas.—Six plants of each to be sent in February.

Bedding Pelargoniums (Geraniums).—Three plants of each in May.

Montbretias.—Six corms of each in February.

Kniphofias (Tritomas).—Three plants of each in February.

Lobelias of the cardinalis, fulgens, and syphilitica sections.—Three plants of each in February.

Vegetables.

Vegetable Marrows.—Not less than six seeds of each variety in February.

Potatos.—Early and mid-season. Each variety must be labelled as being “early” or “mid-season.” Twenty tubers of each by February.

Trial of Cape Pelargoniums.

The Council of the Royal Horticultural Society have been asked to endeavour to obtain an agreement on the Nomenclature of what are commonly known as Cape Pelargoniums. The only practical way known to the Council is to invite all growers of these plants to *at once* send cuttings (rooted or otherwise) with the name known to the sender attached, by post to the Superintendent, R.H.S. Gardens, Wisley, Ripley, Surrey. They will be potted up and next year be compared with each other, and with herbarium specimens, and printed records. No Zonals or Show or French Pelargoniums should be sent; only those known as ‘Cape.’

If sent by post: The Superintendent, R.H.S. Gardens, Wisley, Ripley, Surrey.

If sent by rail: The Superintendent, R.H.S. Gardens, Wisley, Horsley Station, L. & S.-W. R., with advice by post to the Superintendent.

16. THE WISLEY RESEARCH STATION.

Investigations are now in full swing at the new Research Station and Laboratory at Wisley. All communications relating to them should be addressed to Mr. F. J. Chittenden, F.L.S., Director of the Research Work on Scientific Matters affecting Practical Horticulture, and Lecturer to the Students.

17. STUDENTS AT WISLEY.

N.B. There will be a few vacancies for the two years’ Course commencing on March 25, 1912. Early application should be made to the Secretary.

The Society admits young men, between the ages of 16 and 22 years, to study Gardening at Wisley. The curriculum includes not only practical garden work in all the main branches of Horticulture, but also lectures, demonstrations, and Elementary Horticultural Science in the Laboratory, whereby a practical knowledge of simple Garden Chemistry, Biology, &c., may be obtained. The Laboratory is equipped with the best apparatus procurable for Students. The training extends over a period of two years, with a progressive course for each year. Students can enter only at the end of September or at the end of March. Selected Students have the advantage of attending certain of the Society’s Shows and Lectures in London.

18. DISTRIBUTION OF SURPLUS PLANTS.

In a recent Report the Council drew attention to the way in which the annual distribution of surplus plants has arisen. In a large garden

there must always be a great deal of surplus stock, which must either be given away or go to the waste heap. A few Fellows, noticing this, asked for plants which would otherwise be discarded; and they valued what was so obtained. Others hearing of it asked for a share, until the Council felt they must either systematize this haphazard distribution or else put a stop to it altogether. To take the latter step seemed undesirable. Why should not such Fellows have them as cared to receive such surplus plants? It was therefore decided to keep all plants till the early spring, and then give all Fellows alike the option of claiming a share of them by Ballot.

Fellows are therefore particularly requested to notice that only waste and surplus plants raised from seeds or cuttings are available for distribution. Many of them may be of very little intrinsic value, and it is only to avoid their being absolutely wasted that the distribution is permitted. The great majority also are of necessity *very small*, and may require careful treatment for a time.

Fellows are particularly requested to note that a Form of Application and list to choose from of the plants available for distribution is sent in January *every year* to every Fellow, enclosed in the "Report of the Council." To avoid all possibility of favour, all application lists are kept until the last day of February, when they are all thrown into a Ballot; and as the lists are drawn out, so is the order of their execution, the plants being despatched as quickly as possible after March 1.

Of some of the varieties enumerated the stock is small, perhaps not more than twenty-five or fifty plants being available. It is therefore obvious that when the Ballot is kind to any Fellow he will receive the majority of the plants he has selected, but when the Ballot has given him an unfavourable place he may find the stock of almost all the plants he has chosen exhausted. A little consideration would show that all Fellows cannot be first, and some must be last, in the Ballot. Application forms received after March 1 and before April 30 are kept till all those previously received have been dealt with, and are then balloted in a similar way. Fellows having omitted to fill up their application form before April 30 must be content to wait till the next year's distribution. The work of the Gardens cannot be disorganized by the sending out of plants at any later time in the year. All Fellows can participate in the annual distribution *following* their election.

The Society does not pay the cost of packing and carriage. The charge for this will be collected by the carriers on delivery of the plants, which will be addressed exactly as given by each Fellow on his application form. It is impracticable to send plants by post, owing to the lack of Post Office facilities for despatch without prepayment of postage.

Fellows residing beyond a radius of thirty-five miles from London are permitted to choose double the number of plants to which they are otherwise entitled.

Plants cannot be sent to Fellows residing outside the United Kingdom, owing either to length of time in transit or to vexatious regulations in some foreign countries; but the Council will at any time endeavour to obtain for Fellows living abroad any unusual or rare seeds which they may have been unable to procure in their own country.

No plants will be sent to Fellows whose subscription is in arrear, or who do not fill up their forms properly.

19. EXHIBITIONS, MEETINGS, AND LECTURES IN 1912.

The programme will be found in the "Book of Arrangements" for 1912. An Exhibition and Meeting is held practically every fortnight throughout the year, and a short lecture on some subject connected with Horticulture is delivered during the afternoon.

A reminder of every Show will be sent in the week preceding to any Fellow who will send to the R.H.S. Offices, Vincent Square, S.W., a sufficient number (80) of halfpenny cards *ready addressed* to himself.

20. DATES FIXED FOR 1912.

Jan. 9, 23	July 2-4 (Summer Show), 9 & 10
Feb. 6, 13 (Annual Meeting only), 20	(Sweet Peas), 16, 23 (Carnations), 30
March 5 and 6 (Bulb Show), 14-16	Aug. 13, 27
(S. African Fruit Show), 19	Sept. 10, 12 (Autumn Rose Show), 24 (Vegetables)
April 2, 16 and 17 (Daffodils), 30	Oct. 8, 10-11 (Fruit Show), 22
May 14	Nov. 5 and 6 (Orchids), 19
June 4, 18	Dec. 3

21. BRITISH FRUIT AND VEGETABLES.

In 1912, the Great Fruit Show will be held on October 10 and 11 and the Vegetable Show will be combined with the Ordinary Meeting on September 24.

22. CHALLENGE CUPS FOR VEGETABLES.

A handsome Silver-gilt Challenge Cup has been presented to the Society by Messrs. Sutton, of Reading, and the Council will again offer it, with £10, for vegetables on September 24, 1912. The Society also offers a Champion Challenge Cup for the greatest number of points obtained by any one exhibitor throughout the same Exhibition, the winner of the Sutton Cup being excluded. These Cups may be won by the same exhibitor only once in three years, but he may compete every year for any second prize that may be offered.

23. SHOWS OF DAFFODILS AND ORCHIDS, 1912.

The Society will hold a Show of Daffodils on April 16 and 17, when Cups and Medals will be awarded. For the Schedule, apply to the Secretary, R.H.S., Vincent Square, London, S.W.

To demonstrate the value of hybrid Orchids as autumn flowering plants, an Exhibition will be held on November 5 and 6; Cups and Medals are offered. See Book of Schedules to be issued in March.

24. SPRING SHOW OF FORCED BULBS.

A Special Spring Exhibition of Forced Bulbs will be held on March 5 and 6, 1912. The object of this Show is to demonstrate the varieties best suited for gentle forcing, and exhibits of small and large collections are invited from Amateurs and the Trade. R.H.S. Medals will be awarded according to merit.

The Council also offer (subject to the General Rules of the Society) the following Prizes presented to them by the General Bulb Growers' Society of Haarlem :-

Division I.—For Amateurs.

Class 3.—Eighteen Hyacinths, distinct.

1st Prize . . .	£6 6s.	4th Prize . . .	£3 8s.
2nd „ . . .	£5 5s.	5th „ . . .	£2 2s.
3rd „ . . .	£4 4s.	6th „ . . .	£1 1s.

Class 4.—Twelve Hyacinths, distinct.

1st Prize . . .	£5 5s.	4th Prize . . .	£2 2s.
2nd „ . . .	£4 4s.	5th „ . . .	£1 1s.
3rd „ . . .	£3 8s.		

Class 5.—Six Hyacinths, distinct.

1st Prize . . .	£2 2s.	3rd Prize . . .	£1 1s.
2nd „ . . .	£1 10s.	4th „ . . .	10s.

Class 6.—Four pans containing Hyacinths, ten roots of one variety in each pan. The blooms of each pan to be of distinctly different colour from those of the other three pans. The bulbs need not have been actually grown in the pans they are shown in.

1st Prize . . .	£4 4s.	3rd Prize . . .	£2 2s.
2nd „ . . .	£3 8s.	4th „ . . .	£1 1s.

Division II.—For Trade Growers.

Class 7.—Collection of 100 Hyacinths in twenty named varieties, five blooms of each variety grown in pots or glasses.

Prize—The Gold Medal of the General Bulb Growers' Society of Haarlem.

Class 8.—Collection of 120 Hyacinths in twelve varieties in pans, ten roots of one variety in each pan. The bulbs need not have been actually grown in the pans they are shown in.

Prize—The Gold Medal of the General Bulb Growers' Society of Haarlem.

Regulations.—For Classes 3, 4, and 5 each bulb must be in a separate pot (size optional). Classes 3, 4, 5, and 6 must all be single spikes; no spikes may be tied together. Exhibitors may compete in one only of the classes numbered 3, 4, and 5. All bulbs must have been forced entirely in Great Britain or Ireland. All varieties should be correctly named. Points will be deducted for all incorrect names.

BULBS GROWN IN MOSS FIBRE.

Subject to the general rules of the Society the Council offer the following prizes, presented to them by Mr. Robert Sydenham.

Class 9.—Bulbs grown in Moss Fibre or similar material (not earth) and without drainage.

AMATEURS.

Class 10.—Six single Hyacinths, in separate vases, not exceeding six inches in diameter, to be selected from any one of the following varieties : 'Enchantress,' 'General de Wet,' 'Innocence,' 'Jacques,' 'Johan,' 'King Alfred,' 'King of the Blues,' 'Koh-i-Noor,' 'Lady Derby,' 'Ornament Rose,' 'Princess May,' 'Roi des Belges,' 'Rose à Merveille,' 'Schotel.'

Prizes, 21s., 17s. 6d., 15s., 10s. 6d., 7s. 6d.

Class 11.—Six vases of Tulips (vases not exceeding seven inches in diameter), no restriction as to the number of bulbs in a vase, to be selected from the following : 'Duchesse de Parma,' 'Fabiola,' 'Joost van den Vondel,' 'Keizerskroon,' 'La Rêve,' 'Mon Tresor,' 'Prince of Austria,' 'Queen of the Netherlands,' 'Rose Luisante,' 'Van der Neer,' 'Vermilion den Brilliant,' 'White Joost van Vondel.'

Prizes, 21s., 17s. 6d., 15s., 10s. 6d., 7s. 6d.

Class 12.—Six vases of Narcissi (vases not exceeding seven inches in diameter), no restriction as to the number of bulbs in a vase, to be selected from the following : 'Albatross,' 'Blood Orange,' 'Bullfinch,' 'C. J. Backhouse,' 'Dairymaid,' 'Early Easter,' 'Emperor,' 'Glitter,' 'Horace,' 'Leonie,' 'Lilian,' 'Lucifer,' 'Lulworth,' 'Madame de Graaff,' 'Red Coat,' 'Red Flag,' 'Shooting Star,' 'Victoria,' 'White Lady.'

Prizes, 21s., 17s. 6d., 15s., 10s. 6d., 7s. 6d.

If there are more than six exhibits in either of the classes an extra prize of 7s. 6d. will be given in such class if there are eight exhibits; a further 7s. 6d. if there are ten exhibits, and so on in the proportion of one prize for every two exhibits exceeding six in each class.

25. EXAMINATIONS, 1912.

1. The Annual Examination in the Principles and Practice of Horticulture will be held on March 27, 1912. The Examination has two divisions, viz. (a) for Candidates of eighteen years of age and over, and (b) for Juniors *under* eighteen years. Particulars for 1912 may be obtained by sending a stamped and directed envelope to the Society's Offices. Copies of the Questions set from 1893 to 1910 (price 2s. post free) may also be obtained from the Office. The Society is willing to hold an Examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to examinations will consent to supervise one on the Society's behalf.

The Examination will not be held outside the British Isles until further notice.

In connexion with this Examination a Scholarship of £25 a year for

two years is offered by the Worshipful Company of Gardeners, to be awarded after the 1912 Examination to the student who shall pass highest, if he is willing to accept the conditions attaching thereto. The main outline of these conditions is that the holder must be of the male sex, and between the ages of 18 and 22 years, and that he should study gardening for one year at least at the Society's Gardens at Wisley, conforming to the general rules laid down there for Students. In the second year of the Scholarship he may, if he like, continue his studies at some other place at home or abroad which is approved by the Council of the Society. In case of two or more eligible Students being adjudged equal, the Council reserve to themselves the right to decide which of them shall be presented to the Scholarship.

2. The Society will also hold an Examination in Cottage Gardening on April 17, 1912. This Examination is intended for, and is confined to, Elementary and Technical School Teachers. It is undertaken in view of the increasing demand in country districts that the Schoolmaster shall be competent to teach the elements of Cottage Gardening, and the absence of any test of such competence. The general conduct of this Examination is on similar lines to that of the more general Examination. Questions on Elementary Chemistry and Biology are included in this Examination.

3. The Society will hold an Examination in the Royal Horticultural Hall, Vincent Square, S.W., on Monday, January 8, 1912, for gardeners employed in Public Parks and Gardens belonging to County Councils, City Corporations, and similar bodies. Entries close on January 1, 1912.

Medals and Certificates are awarded and Class Lists published in connexion with these Examinations. The Syllabus may be obtained on application to the Secretary, R.H.S., Vincent Square.

26. INFORMATION.

Fellows may obtain information and advice from the Society as to the names of flowers and fruit, on points of practice, insect and fungoid attacks, and other questions by applying to the Secretary, R.H.S., Vincent Square, Westminster, S.W. Where at all practicable it is particularly requested that letters and specimens may be timed to reach Vincent Square by the first post on the mornings of the Fortnightly Meetings, so as to be laid before the Scientific or other Committees at once.

27. INSPECTION OF FELLOWS' GARDENS.

The Inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and advises at the following cost, viz. a fee of £8 8s. for one day (or £5 5s. for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their gardens. Gardens can only be inspected at the *written* request of the *owner*.

28. AFFILIATION OF LOCAL SOCIETIES.

One of the most successful of the many new branches of work undertaken since the reconstruction of the Society in 1887 is the unification of local Horticultural Societies by a scheme of affiliation to the R.H.S. Since this was initiated no fewer than 300 Societies have joined our ranks, and the number is steadily increasing.

The Parent Society offers annually a Silver Challenge Cup to be competed for by Affiliated Societies. (For alteration of conditions, see "Book of Schedules," under date October 10 and 11.)

To the privileges of Affiliated Societies have been added all the benefits accruing under the scheme recently introduced for the Union of Horticultural Mutual Improvement Societies.

Secretaries of Affiliated Societies can obtain on application a specimen of a Card which the Council have prepared for the use of Affiliated Societies for Certificates, Commendations, &c. Price 3s. 6d. for 10 copies, 5s. 6d. for 20, 11s. 6d. for 50, 20s. for 100.

The Council have also struck a special Medal for the use of Affiliated Societies. It is issued at cost price in Bronze, Silver, and Silver-gilt—viz. Bronze, 5s. 6d., with case complete; Silver, 12s. 6d., with case complete; Silver-gilt, 16s. 6d., with case complete. Award Cards having the Medal embossed in relief can be sent with the Medal if ordered, price 6d. each.

29. UNION OF HORTICULTURAL MUTUAL IMPROVEMENT SOCIETIES.

This Union has been established for the encouragement and assistance of Horticultural Mutual Improvement Societies, the object being to strengthen existing Societies, to promote interchange of lecturers, to provide printed lectures, and if possible to increase the number of these useful Societies.

A new and revised list of lecturers and their subjects, and a list of typewritten lectures, with or without lantern slides, prepared by the Society, may be obtained from the Secretary, R.H.S., price 8d.

Lantern slides on horticultural topics are much needed, and their gift will be very much appreciated.

30. ALTERATIONS IN RULES FOR JUDGING—1911 CODE.

The "Rules for Judging, with Suggestions to Schedule Makers and Exhibitors," have been revised, and the new edition is now ready. Special attention is drawn to the amended Rule defining "an amateur," with suggestions for establishing four distinct classes of amateurs to meet the requirements of larger or smaller local Societies. (See also p. 86, "Book of Arrangements.") The "pointing" recommended for fruits and vegetables has also been considerably amended, and the terms "annuals" and "biennials" further explained. The secretaries of local Societies

are advised to obtain a fresh copy. It will be sent post free on receipt of a postal order for 1s. 6d., addressed to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W.

Exhibitors of vegetables are specially warned that the numbers of specimens to a dish appearing on p. 19 of the 1909 Code of Rules have been still further modified.

31. SPRAYING OF FRUIT TREES.

The Report of the Conference on the Spraying of Fruit Trees, held in the R.H.S. Hall on October 16, 1908, may still be obtained at the Society's Offices, Vincent Square, Westminster, price 1s. The book deals with the methods of spraying fruit trees for both insect and fungus pests, with information as to washes and spraying machinery, and forms the latest collated information on this subject.

32. VARIETIES OF FRUITS.

Many people plant Fruit trees without a thought of what Variety they shall plant, and as a result almost certain disappointment ensues, whilst for an expenditure of 2d. they can obtain from the Society a little 16-page pamphlet which contains the latest expert opinion on Apples, Pears, Plums, Cherries, Raspberries, Currants, Gooseberries, and Strawberries, together with Notes on Planting, Pruning, and Manuring, which for clearness of expression and direction it would be impossible to surpass. It has in fact been suggested that no other 16 pages in the English language contain so much and such definite information. At the end of the pamphlet are given the names of some of the newer varieties of Fruits, which promise well, but are not yet sufficiently proved to be recommended for general planting.

Copies of this pamphlet for distribution may be obtained at the Society's Office, Vincent Square, Westminster. Price, post free: single copy, 2d., or 25, 2s.; 50, 8s.; 100, 4s.

33. PLANTS CERTIFICATED.

The last-published list of "Plants Certificated by the Society" commenced with the year 1859 and closed with 1899. A further 11 years have now passed and the Council have republished the list up to the end of 1910, constituting a record of all the plants which have received awards during the past 50 years. The completed list will be of great assistance to amateurs and an absolute necessity to raisers and introducers of new plants. It is now ready, price 2s. post free, not including Orchids.

ORCHIDS CERTIFICATED.

The list of awards made to Orchids, with parentage, &c., has recently been published separately, and may be obtained at the Society's Office, Vincent Square, Westminster, bound in cloth and interleaved, price 5s. net.

34. RECOGNITION OF DILIGENT INTEREST IN PLANTS.

The Council have founded a card of "Recognition of Diligent Interest in Plants." Issued in response to frequent applications by school authorities for some token of encouragement of work with plants amongst scholars, it is to be awarded to the boy or girl (or both) who, in the yearly school competitions in plant cultivation, or garden plot keeping, or Nature study, has secured the first prize. The cards are 12 inches by 8 inches, and may be had on application to the Secretary, R.H.S., Vincent Square, London, S.W. (price 6d. each), and signed by the head master or mistress and a member of the education authority concerned. The application should contain information as to (a) the nature of the competition, (b) the number of competitors, (c) the judges, (d) the number of prizes awarded in the competition, (e) the full name of the first prize winner. The Council of the R.H.S. will at their own absolute discretion grant or withhold this "recognition."

35. MS. FOR JOURNAL.

The Editor is always glad to receive suitable articles for issue in the JOURNAL from corresponding and other Fellows of the Society. It is thought that much more might be done in this direction to disseminate valuable botanical and horticultural information, and to publish records of work and research conducted by other than actual official members of the Society. The JOURNAL is received by the best libraries in the world, and is regularly sent to all the 12,000 Fellows of the Society.

36. ADVERTISEMENTS.

Fellows are reminded that the more they can place their orders with those who advertise in the Society's Publications the more likely others are to advertise also, and in this way the Society may be indirectly benefited.

37. SHIRLEY POPPIES.

The Secretary will be pleased to send a packet of his 1911 crop of Shirley Poppy Seed to Fellows who like to send to Rev. W. Wilks, Shirley Vicarage, Croydon, a stamped envelope ready addressed to themselves. The seed should be sown as early as possible in March. This is an offer made by the Secretary in his private capacity, and it causes much inconvenience when requests for seed are mixed up with letters sent to the office in London instead of as above directed.

38. ANONYMOUS GIFT.

The Secretary of the Society wishes to thank some kind friend, who in October sent him (without any name or address beyond the word

"Nottingham") a charming selection of fruit "grown in a little town garden of $\frac{1}{4}$ of an acre, largely the result of the Royal Horticultural's help." The Cox's Orange apples were excellent and fine specimens; the Lord Suffield, grand; the King of Tompkins, very highly coloured; a very large pear was not true to name—probably Beurré Diel.

39. INTERNATIONAL HORTICULTURAL EXHIBITION, MAY 22-30, 1912.

Most of the Fellows of the Society will have already heard that an Association has been formed to organize an International Flower Show in London next spring, as the outcome of a suggestion made by the Council in their Report for the year 1909, that such a courtesy on the part of Great Britain was due (or indeed overdue) to the Continent and to America for the many similar hospitalities which foreign countries have offered to British horticulturists.

It must be fully understood and constantly borne in mind that the Royal Horticultural Society is not organizing the Exhibition, nor in any way responsible for anything connected therewith. All responsibility rests with the Directors as in every other public Company. Fellows are, therefore, asked to recognize the Exhibition as being absolutely distinct from the Society, being, in fact, an entirely separate and independent organization. The Society has, however, welcomed the proposal that such an International Exhibition should be held, and will render the Association every reasonable assistance in its power.

The Association, recognizing the importance of securing the great weight of horticultural interest vested in the Society, have approached the Council with a view to establishing a suitable friendly working arrangement between the two bodies, and—

(a) The Royal Horticultural Society has agreed—

1. To contribute £1,000 towards the expenses of promoting the International Exhibition; and
2. To guarantee a further sum of £4,000 against the contingency of there being an ultimate loss on the Exhibition.

(b) The Directors of the International Exhibition Association have agreed—

1. To give to all Fellows of the Society certain special and definite privileges over the General Public in regard to the purchase of tickets for the Exhibition; and
2. To allow all such tickets purchased by Fellows of the Society to be transferable.

The cost of organizing the International will, we understand, reach nearly, if not quite, £25,000—a very heavy responsibility for the Directors to face; but they are doing so, relying on the support of all British lovers of gardens, and especially of the Fellows of the Royal Horticultural Society.

ADMISSION ARRANGEMENTS.

The Directors of the International Exhibition Association have decided on the following prices of admission for the General Public:—

	Before 5 P.M.	5 to 10 P.M.		All day.
May 22 . . .	£2 2s. . .	£1 1s. . .	May 27 . . .	2s. 6d.
" 23 . . .	£1 1s. . .	10s. . .	" 28 . . .	1s.
" 24 . . .	10s. . .	5s. . .	" 29 . . .	1s.
" 25 . . .	5s. . .	2s. 6d. . .	" 30 . . .	1s.

FELLOWS OF THE R.H.S.

The special privileges accorded to Fellows of the Royal Horticultural Society are as follows:—

Fellows of the R.H.S. paying an Annual Subscription of	MAY 22	MAY 23	MAY 24, 25, 27	MAY 28, 29, 30
£4 4s., or £4 4s. Life Fellows	Two tickets at half-price and	Two tickets at half-price and	and Four tickets for any, but only one, of these days; with two additional tickets for May 25 all at half-price	No reduction
£2 2s., or £2 2s. Life Fellows	One ticket at half-price and	One ticket at half-price and	and Two tickets for any, but only one, of these days; with one additional ticket for May 25 all at half-price	No reduction
£1 1s., or Life Fellows	One ticket at 30s.; or at 10s. 6d. after 5 P.M.	and One ticket at half-price for any, but only one, of these four days		No reduction
Honorary and Corresponding Members	The same privileges as £2 2s. Fellows			
Associates	No reduction		One ticket on May 25 or 27 at half-price.	No reduction
£1 1s. Affiliated Societies	No reduction		Ten tickets on May 25 and 16 tickets on May 27—all at half-price	No reduction
£2 2s. Aff. Soc. double privileges				

N.B.—All privileged tickets in accordance with the above scale for R.H.S. Fellows, &c., must be purchased on or before May 12, and can only be obtained direct from the office of the Royal Horticultural Society, Vincent Square, Westminster, S.W.

All the above special tickets will be transferable, but will each be available for one admission only. Fellows can, therefore, circulate among their friends such of the tickets as they do not personally require. Cheques or postal orders payable to the Royal Horticultural Society must accompany every application for tickets, and tickets when once purchased cannot be exchanged for others of a different date. See following pages. Letters of inquiry requiring an answer must contain an envelope ready addressed and stamped.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

SEPTEMBER 12, 1911.

Sir ALBERT KAYE ROLLIT, D.C.L., LL.D., in the Chair.

A lecture on "Small-Holdings and the Small-Holder" was given by Mr. Thomas Smith (see p. 295).

GENERAL MEETING.

SEPTEMBER 26, 1911.

Mr. ARTHUR W. SUTTON, J.P., F.L.S., V.M.H., in the Chair.

Fellows elected (57).—J. Abbott, J. G. Adamson, Mrs. Cedric R. Boulton, E. J. Brown, R. Brown, E. Browne, E. Carter, C. P. Chalk, C. W. Clarke, G. H. Clewlow, E. Conolly, D. F. Corson, P. B. Cow, Mrs. E. Coward, Mrs. H. G. Cumming, Mrs. Davison, Mrs. B. Ellis, R. R. Fordham, Rev. R. D. Gibson, J. G. Gordon-Woodhouse, Miss C. M. Griffiths, G. Hatch, C. A. Henry, H. M. Hubbard, T. R. Hughes, Mrs. R. Inglis, Lady Johnston, A. Jowett, L.C.P., Miss E. J. Le Couteur, H. G. Mackson, Miss E. M. Marker, Mrs. Aubrey Maude, Mrs. F. Mavor, William Miles, Mrs. R. Mills, C. G. Montefiore, Miss J. Mullens, Mrs. A. Noel, P. S. Patrick, E. J. Radford, A. W. Redford, Mrs. J. Rigden, A. E. Rogers, Mrs. F. Romer, Mrs. J. Roskill, W. C. Scadding, A.C.P., G. C. Seeviour, A.C.P., Alban H. Sharp, Miss C. Sopper, Miss D. Stanier, E. J. Stephens, C. E. L. Tilden, H. V. Travers, Colonel E. Walker, Mrs. Waring, J. J. Wilson, F. Woodin.

Fellows resident abroad (6).—Mrs. F. S. Barnard (B.C.), Major J. M. Burn (India), Mrs. Butchart (B.C.), W. J. Newberry (Natal), P. A. Valentine (U.S.A.), G. Wrigglesworth (N.Z.).

Associates (4).—Mrs. Blair, Miss M. H. Milner, Miss D. B. Roberts, Harry Thomas.

Societies affiliated (3).—Chislehurst Amateur Horticultural Society, Transvaal Horticultural Society, Wellington (N.Z.) Rose and Carnation Club.

A lecture on "Salads and Salad-making" was given by Mr. C. Herman Senn (see p. 302).

SECOND ANNUAL EXHIBITION OF VEGETABLES.

HELD IN THE SOCIETY'S HALL, VINCENT SQUARE, S.W.

SEPTEMBER 26, 1911.

THE JUDGES.

Bates, W., Cross Deep Gardens, Twickenham.
Bunyard, G., V.M.H., Royal Nurseries, Maidstone.
Cheal, J., Lowfield Nurseries, Crawley.
Dean, A., V.M.H., 62 Richmond Road, Kingston.
Divers, W. H., Belvoir Castle Gardens, Grantham.
Fielder, C. R., V.M.H., Great Warley, Essex.
Fyfe, W., Lockinge Park Gardens, Wantage.
Hudson, J., V.M.H., Gunnersbury House Gardens, Acton, W.
Pearson, A. H., V.M.H., The Hut, Lowdham, Notts.
Pope, W., Welford Park Gardens, Newbury, Berks.
Poupard, W., Marsh Farm, Twickenham.
Thomas, O., V.M.H., 25 Waldeck Road, West Ealing.

OFFICIAL PRIZE LIST.

THIS EXHIBITION WAS OPEN TO AMATEURS ONLY.

The Owner's name and address and the Gardener's name are entered on the first occurrence, but afterwards only the Owner's name is recorded.

Collections.

N.B.—A competitor can enter in only one of the first three Classes. Arrangement will be taken into consideration by the Judges.

Class 1.—12 kinds distinct to be selected from the subjoined list. Number of specimens to be in accordance with rules. Beet, Brussels Sprouts, Cabbage, Couve Tronchuda, Broccoli or Cauliflower, Carrots, Savoy, Celery, Cucumbers, Endive, Leeks, Lettuce, Mushrooms, Onions, Parsnips, Peas, Potatos, Tomatos, Turnips, Beans, Runner or French.

First Prize, The Sutton Challenge Cup (Value £21) and £10;

Second, £5; Third, £3; Fourth, £2.

The winner will hold the Cup for one year subject to a guarantee of its return in good condition, or, failing this, to refund to the R.H.S. the sum of £25. An Exhibitor may win the Cup only once in 3 years, but the winner may compete the following year, and if adjudged first in these two successive years will receive a smaller commemorative cup.

1. Duke of Portland, Welbeck Abbey, Worksop (gr. J. Gibson).
2. H. T. Tatham, Esq., Kendall Hall, Elstree, Herts (gr. W. Gaiger).
3. W. Folkes, Esq., Ampthill, Beds.

Class 2.—9 kinds distinct, to be selected from the list in Class 1.
Number of specimens as stated.

First Prize, £5; Second, £3; Third, £2; Fourth, £1.

1. Hon. Vicary Gibbs, Aldenham House, Elstree (gr. E. Beckett).

Class 3.—6 kinds distinct, to be selected from the list in Class 1.
Number of specimens as stated.

First Prize, £3; Second, £2 5s.; Third, £1 10s.; Fourth, 15s.

1. W. H. Myers, Esq., Swanmore Park, Bishops Waltham (gr. G. Ellwood).
2. J. Kerr, Esq., Loudwater, Rickmansworth, Herts (gr. T. Avery).
3. H. Keep, Esq., Aldermaston, Reading.
4. B. Henderson, Esq., Epping House, Little Berkhamsted (gr. H. Smith).

Class 4.—Potatos—Collection of 12 varieties distinct.

First Prize, £3; Second, £2; Third, £1.

1. Mrs. H. Denison, Little Gaddesden, Berkhamsted (gr. A. G. Gentle).
2. Mr. A. Basile, Woburn Park Gardens, Weybridge.
3. Duke of Portland.

Class 5.—Potatos—Collection of 6 varieties distinct.

First Prize, £1 10s.; Second, £1; Third, 10s.

Competitors in Class 4 cannot enter in 5.

1. Hon. Vicary Gibbs.
2. W. H. Myers, Esq.
3. H. T. Tatham, Esq.

Class 6.—Onions—Collection of 6 varieties distinct.

First Prize, £2; Second, £1; Third, 10s.

1. Hon. Vicary Gibbs.
2. Duke of Portland.
3. A. B. H. Goldschmidt, Esq., Cavenham Park, Mildenhall, Suffolk (gr. G. Hatch).

Class 7.—Salads—Collection of 9 kinds distinct, each kind to be staged separately.

First Prize, £3 10s.; Second, £2 10s.; Third, £1 5s.

1. Hon. Vicary Gibbs.
2. H. T. Tatham.

Class 8.—Salads—Collection of 6 kinds distinct, each kind to be staged separately.

First Prize, £2 5s.; Second, £1 10s.; Third, 15s.

Competitors in Class 7 cannot enter in Class 8.

1. W. H. Myers, Esq.
2. B. Henderson, Esq.

CLXXXII PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Class 9.—Other Vegetables—6 kinds distinct, to be selected from the following:—Cardoons, Capsicum or Chili, Celeriac, Pumpkin, *Stachys tuberifera*, Seakale, Egg Plant, Jerusalem Artichoke, Salsify, Scorzonera, Kohl Rabi.

First Prize, £2 10s.; Second, £1 10s.; Third, 15s.

1. Hon. Vicary Gibbs.

2. W. H. Myers, Esq.

3. Lady Tress Barry, St. Leonards Hill, Windsor (gr. R. Brown).

Single Dish Classes.

In Classes 10-41 the First Prize is in each case 10s., the Second 7s. 6d., Third, 5s. The specimens shown in each Class must be always of one and the same variety.

Class 10.—Beans, Scarlet Runners.

1. Duke of Portland.

2. Hon. Vicary Gibbs.

3. Rev. L. C. Chalmers Hunt, Willian Rectory, Hitchin, Herts.

Class 11.—Beans, French Climbers.

1. Lord Foley, Ruxley Lodge, Claygate, Surrey (gr. H. C. Gardner).

2. Hon. Vicary Gibbs.

3. Mr. R. Staward, Panshanger Gardens, Hertford.

Class 12.—Beans, French Dwarf.

1. J. D. Alexander, Esq., Oakbank, Sevenoaks (gr. J. T. Tubb).

2. Hon. Vicary Gibbs.

3. R. H. Comyns, Esq., Heath Farm, Watford (gr. W. Waterton).

Class 13.—Beet, any one type.

1. Duke of Portland.

2. Mrs. H. Denison.

3. R. H. Comyns, Esq.

Class 14.—Brussels Sprouts, 50 buttons.

1. Duke of Portland.

2. W. H. Myers, Esq.

3. Mr. A. Basile.

Class 15.—Brussels Sprouts, 3 plants.

1. Duke of Portland.

2. Hon. Vicary Gibbs.

3. Mr. R. Staward.

Class 16.—Cabbage.

1. Mr. A. Basile.

2. Lord Foley.

3. Hon. Vicary Gibbs.

Class 17.—Cabbage, Savoy.

1. Duke of Portland.
2. Hon. Vicary Gibbs.
3. Mr. R. Staward.

Class 18.—Cauliflower or Broccoli.

1. W. H. Myers, Esq.
2. Hon. Vicary Gibbs.
3. Duke of Portland.

Class 19.—Celery, White.

1. Hon. Vicary Gibbs.
2. H. Keep, Esq.
3. R. H. Comyns, Esq.

Class 20.—Celery, Red.

1. Hon. Vicary Gibbs.
2. H. T. Tatham, Esq.
3. H. Keep, Esq.

Class 21.—Cucumbers.

1. Hon. Vicary Gibbs.
2. J. Kerr, Esq.
3. Lord Foley.

Class 22.—Leeks.

1. W. H. Myers, Esq.
2. Hon. Vicary Gibbs.
3. Mr. R. Staward.

Class 23.—Marrows.

1. Mr. A. Basile.
2. Lord Foley.
3. Mr. R. Staward.

Class 24.—Mushrooms.

1. Mrs. H. Pryce, 43 Willow Street, Westminster.
2. Hon. Vicary Gibbs.
3. No award.

Class 25.—Onions, Round or Globular.

1. A. Banks, Esq., Wolfeton House, Dorchester (gr. G. W. Taylor).
2. J. D. Alexander, Esq.
3. Hon. Vicary Gibbs.

Class 26.—Onions, Flat.

1. W. H. Myers, Esq.
2. Mr. D. W. Bedford, The Braes Gardens, Berkhamsted.
3. J. D. Alexander, Esq.

Class 27.—Parsnips.

1. Hon. Vicary Gibbs.
2. W. H. Myers, Esq.
3. Duke of Portland.

Class 28.—Carrots, Long.

1. Duke of Portland.
2. Mrs. H. Denison.
3. W. H. Myers, Esq.

Class 29.—Carrots, Stump-rooted or Short.

1. W. H. Myers, Esq.
2. Hon. Vicary Gibbs.
3. Mrs. H. Denison.

Class 30.—Peas.

1. Duke of Portland.
2. Hon. Vicary Gibbs.
3. R. H. Comyns, Esq.

Class 31.—Turnips, White, Skin and Flesh.

1. Hon. Vicary Gibbs.
2. Duke of Portland.
3. Mr. A. Basile.

Class 32.—Turnips, Parti-coloured.

1. Mr. A. Basile.
2. Hon. Vicary Gibbs.
3. No award.

Class 33.—Turnips, Yellow Flesh.

1. Hon. Vicary Gibbs.
2. Duke of Portland.
3. No award.

Class 34.—Potatos, White.

1. Mr. A. Basile.
2. R. H. Comyns, Esq.
3. Duke of Portland.

Class 35.—Potatos, Coloured.

1. Mrs. Denison.
2. Hon. Vicary Gibbs.
3. Duke of Portland.

Class 36.—Kale, Dwarf.

1. H. T. Tatham, Esq.
2. Hon. Vicary Gibbs.
3. Duke of Portland.

Class 37.—Kale, Tall.

1. Duke of Portland.
2. Hon. Vicary Gibbs.
3. No award.

Class 38.—Tomatos, Red.

1. Hon. Vicary Gibbs.
2. W. H. Myers, Esq.
3. Duke of Portland.

Class 39.—Tomatos, Yellow.

1. Hon. Vicary Gibbs.
2. Lord Foley.
3. Lady Tress Barry.

Class 40.—Tomatos, Ornamental.

1. Mrs. H. Denison.
2. B. Henderson, Esq.
3. No award.

Class 41.—Any other Vegetables not named in the Schedule.

1. Hon. Vicary Gibbs.
2. Lady Tress Barry.
3. Mrs. H. Denison.

CHAMPION CHALLENGE CUP.

The Champion Cup will be held for one year (subject to a guarantee of its return in good condition) by the winner of the greatest number of First Prize points throughout the whole Exhibition, the winner in Class 1 being excluded. An Exhibitor may win this cup only once in three years, but the winner may compete the following year, and if adjudged first in these two successive years will receive a smaller commemorative Cup. In calculating for this Champion Cup the number of points reckoned for each First Prize will be as follows :—

Class 2	...	...	...	...	9 Points each.
Classes 3, 4, 7	...	...	...	6	„ „
Classes 5, 6, 8, 9	...	...	...	4	„ „
All other Classes	...	...	...	1 Point	„

In case of an equality (and only in that case) Second Prizes will be counted, in order to arrive at a decision, each Second Prize counting half the points allotted to the First Prize.

Hon. Vicary Gibbs 36 points.

GENERAL MEETING.

OCTOBER 10, 1911.

Mr. J. GURNEY FOWLER in the Chair.

Fellows elected (25).—G. Norman Bunyard, H. J. Burgess, Miss Burton, D. H. H. Church, J. H. Crane, Mrs. Dautesey. W. R.

FitzHugh, H. V. Gibbs, A. E. Haarer, Captain W. Henry, Miss G. Hill, R. H. Holmes, J. R. Hortor, A. G. Hunt, A. Lelliott, J. E. Logan, Miss G. L. Oldfield, H. H. Peace, T. J. Poupart, A. Simon, W. H. Sims, F. J. White, Rev. W. A. Willis, Mrs. H. Wills, Hon. Mrs. Winn.

Fellows resident abroad (1).—Major J. French-Mullen (Burma).

Associates (2).—Miss D. M. Gisborne, Miss E. W. Solomon.

Societies affiliated (2).—Beeding and Bramber Horticultural Society, Hale End Horticultural Society.

SEVENTEENTH ANNUAL EXHIBITION OF BRITISH-GROWN FRUIT.

HELD AT THE SOCIETY'S HALL, VINCENT SQUARE, S.W.
OCTOBER 10 AND 11, 1911.

THE JUDGES.

Allan, W., Gunton Park Gardens, Norwich.
Arnold, T., Cirencester Park Gardens, Gloucester.
Bacon, W. H., Mote Park Gardens, Maidstone.
Barnes, N. F., Eaton Gardens, Chester.
Barnes, W., Bearwood Gardens, Wokingham.
Basham, J., Bassaleg, Newport, Mon.
Bates, W., Cross Deep Gardens, Twickenham.
Beckett, E., V.M.H., Aldenham House Gardens, Elstree.
Bowerman, J., Southcote Manor Gardens, Reading.
Challis, T., V.M.H., Wilton House Gardens, Salisbury.
Cheal, J., Crawley, Sussex.
Coomber, T., V.M.H., The Hendre Gardens, Monmouth.
Cornford, J., Quex Park Gardens, Birchington.
Crouch, C., St. Anne's Hill Gardens, Chertsey.
Crump, W., V.M.H., Madresfield Court Gardens, Malvern.
Davis, J., Glebelands Gardens, S. Woodford.
Dean, A., V.M.H., 62 Richmond Road, Kingston.
Divers, W. H., Belvoir Castle Gardens, Grantham.
Doe, J., Rufford Gardens, Ollerton, Notts.
Douglas, J., V.M.H., Great Bookham, Surrey.
Earp, W., Bayham Abbey Gardens, Lamberhurst.
Fielder, C. R., V.M.H., The Gardens, Great Warley, Brentwood.
Fyfe, W., Lockinge Park Gardens, Wantage.
Gibson, J., Welbeck Abbey Gardens, Worksop.
Goodacre, J. H., V.M.H., Elvaston Castle Gardens, Derby.
Jaques, J., Grey Friars, Chorley Wood, Herts.
Mackellar, A., V.M.H., Royal Gardens, Windsor.
Markham, H., Wrotham Park Gardens, High Barnet.
Molyneux, E., V.M.H., Swanmore Park Gardens, Bishops Waltham.

Mortimer, S., Rowledge, Farnham, Surrey.
 Paul, G., J.P., V.M.H., Cheshunt, Herts.
 Pearson, A. H., V.M.H., The Hut, Lowdham, Notts.
 Pope, W., Welford Park Gardens, Newbury, Berks.
 Poupart, W., Marsh Farm, Twickenham.
 Reynolds, G., Gunnersbury Park Gardens, Acton, W.
 Rivers, H. S., Sawbridgeworth.
 Ross, C., V.M.H., Cedar House, Barford, Warwick.
 Salter, C. J., Normanhurst Gardens, Rusper, Horsham.
 Smith, J. R., Bedgebury Park Gardens, Goudhurst, Kent.
 Turton, T., Sherborne Castle Gardens, Dorset.
 Veitch, P. C. M., J.P., New North Road, Exeter.
 Vert, J., Audley End Gardens, Saffron Walden.
 Ward, A., Godinton Gardens, Ashford, Kent.
 Weston, J. G., Eastwell Park Gardens, Ashford, Kent.
 Whittle, J., Cheveney Gardens, Hunton, Maidstone.
 Williams, H. H., Pencalenick, Truro.
 Woodward, G., Barham Court Gardens, Teston, Maidstone.
 Wythes, G., V.M.H., Briccalees, Bovington, Herts.

THE REFEREES.

Bunyard, G., V.M.H., Royal Nurseries, Maidstone.
 Hudson, J., V.M.H., Gunnersbury House Gardens, Acton, W.
 Pearson, A. H., V.M.H., The Hut, Lowdham, Notts.
 Thomas, O., V.M.H., 25 Waldeck Road, West Ealing.

OFFICIAL PRIZE LIST.

The Owner's name and address and the Gardener's name are entered on the first occurrence, but afterwards only the Owner's name is recorded.

DIVISION I.

Fruits grown under Glass or otherwise.

Open to Gardeners and Amateurs only.

NOTE.—Exhibitors may compete in one Class only of Classes 1, 2, and of Classes 3, 4.

Class I.—Collection of 9 dishes of Ripe Dessert Fruit:—6 kinds at least; only 1 Pine, 1 Melon, 1 Black, and 1 White Grape, allowed; not more than 2 varieties of any other kind, and no two dishes of the same variety.

First Prize, Silver Cup and £5; Second, £5; Third, £3.

1. Earl of Harrington, Elvaston, Derby (gr. J. H. Goodacre).
2. Duke of Newcastle, Clumber, Worksop (gr. S. Barker).
3. C. A. Cain, Esq., The Node, Welwyn (gr. T. Pateman).

Class 2.—Collection of 6 dishes of Ripe Dessert Fruit:—4 kinds at least; only 1 Melon, 1 Black, and 1 White Grape allowed; not more

than 2 varieties of any other kind and no two dishes of the same variety. Pines excluded.

First Prize, Silver Cup and £3; Second, £3; Third, £2.

1. G. Miller, Esq., Newberries, Radlett (gr. J. Kidd).
2. Marquis of Salisbury, Hatfield, Herts (gr. H. Prime).
3. Lord Howard de Walden, Saffron Walden (gr. J. Vert).

Class 3.—Grapes, 5 distinct varieties (2 bunches of each), of which two at least must be White.

First Prize, Silver Cup and £4; Second, £4.

1. Earl of Harrington.
2. Duke of Newcastle.

Extra 3. G. Miller, Esq.

Class 4.—Grapes, 4 varieties, selected from the following: 'Madresfield Court,' 'Mrs. Pince,' 'Muscat Hamburg,' 'Muscat of Alexandria' or 'Canon Hall' (not both), 'Mrs. Pearson,' and 'Dr. Hogg,' 2 bunches of each.

First Prize, Silver Cup and £3; Second, £3.

1. Lord Hillingdon, Wildernes, Sevenoaks (gr. J. Shelton).
2. No award.

Class 5.—Grapes, Black Hamburg, 2 bunches.

First Prize, £1 10s.; Second £1; Third, 10s.

1. Lord Hillingdon (gr. J. Shelton).
2. Rev. W. Becker, Wellow Hall, Newark (gr. A. Heald).
3. Earl of Harrington.

Class 6.—Grapes, Mrs. Pince, 2 bunches.

First Prize, £1 10s.; Second, £1.

1. Lord Savile, Rufford Abbey, Ollerton, Notts (gr. J. Doe).
2. O. E. d'Avigdor-Goldsmid, Esq., Somerhill, Tonbridge (gr. C. Earl).

Class 7.—Grapes, Alicante, 2 bunches.

First Prize, £1 10s.; Second, £1; Third, 10s.

1. G. Miller, Esq.
2. W. James, Esq., West Dean Park, Chichester (gr. W. H. Smith).
3. G. Hanbury, Esq., Hitcham, Maidenhead (gr. C. L. Branson).

Class 8.—Grapes, Madresfield Court, 2 bunches.

First Prize, £1 10s.; Second, £1; Third, 10s.

1. Earl of Harrington.
2. Duke of Newcastle.
3. Lord Hillingdon (gr. J. Shelton).

SEVENTEENTH EXHIBITION OF BRITISH-GROWN FRUIT. clxxxix

Class 9.—Grapes, Prince of Wales, 2 bunches.

First Prize, £1 10s.; Second, £1.

1. Lord Savile.
2. Earl Stanhope, Chevening Park, Sevenoaks (gr. J. C. Sutton).

Class 10.—Grapes, any other Black Grape, 2 bunches.

First Prize, £1 10s.; Second, £1.

1. Earl of Harrington.
2. G. Miller, Esq.

Class 11.—Grapes, Muscat of Alexandria, 2 bunches.

First Prize, £2; Second, 25s.; Third, 15s.

1. Sir E. Durning Lawrence, King's Ride, Ascot (gr. W. Lane).
2. Earl of Harrington.
3. O. E. d'Avigdor-Goldsmid, Esq.

Class 12.—Grapes, any other White Grape, 2 bunches.

First Prize, £1 10s.; Second, £1; Third, 10s.

1. Lady Tate, Park Hill, Streatham Common (gr. W. Howe).
2. Duke of Newcastle.
3. H. W. Henderson, Esq., Serge Hill, King's Langley (gr. F. L. Pike).

Class 13.—Collection of Hardy Fruits, in a space not exceeding 12 x 3': 30 dishes distinct, grown entirely in the open; not more than 12 varieties of Apples or 8 of Pears.

First Prize, The Hogg Medal and £3; Second, £2; Third, £1.

1. Colonel A. C. Borton, Cheveney, Hunton, Kent (gr. J. Whittle).
2. Sir Marcus Samuel, Bart., Mote Park, Maidstone (gr. W. H. Bacon).
3. Major Powell-Cotton, Quex Park, Birchington (gr. J. Cornford).

DIVISION II.

Open to Nurserymen only.

Nurserymen and Market Growers must exhibit as individuals or as firms. *They must have actually grown all they exhibit.* Combinations of individuals or firms are not allowed, nor the collection of produce from different districts.

Nurserymen and Market Growers desiring to exhibit at this Show must make application for space as under Class 14 or 15 or 16 or 17; 18, 19; 20 or 21 or 22. No other spaces but the above can be allotted. Exhibitors can only enter in one of Classes 14 to 17; or in one of 20, 21 and 22.

Nurserymen and Market Growers may adopt any method of staging and number of fruits to a dish they desire. The use of berries and foliage plants is allowed for decoration but not flowers.

For Fruit grown entirely out of doors.

Class 14.—30 feet run of 6 feet tabling.

Messrs. G. Bunyard, Maidstone: Gold Medal.

Messrs. H. Cannell, Swanley: Silver-gilt Hogg Medal.

King's Acre Nurseries, Hereford: Silver-gilt Hogg Medal.

Class 15.—20 feet run of 6 feet tabling.

Messrs. Laxton Bros., Bedford: Silver Hogg Medal.

Mr. R. C. Notcutt, Woodbridge: Silver Knightian Medal.

Class 16.—12 feet run of 6 feet tabling.

Messrs. G. Cooling, Bath: Silver Knightian Medal.

Messrs. Daysh & Wright, Alton, Hants: Silver Banksian Medal.

Messrs. J. Peed, West Norwood: Bronze Knightian Medal.

Class 17.—6 feet run of 6 feet tabling.

No entry.

For Orchard House Fruit and Trees.

Class 18.—24 feet by 6 feet of stage. Grapes excluded.

Messrs. T. Rivers, Sawbridgeworth: Gold Medal.

King's Acre Nurseries, Hereford: Silver-gilt Hogg Medal.

Class 19.—9 Vines, growing in pots, not less than three varieties.

Messrs. T. Rivers, Sawbridgeworth: Silver-gilt Knightian Medal.

DIVISION III.

Open to Market Growers only.

Class 20.—Apples, 20 baskets of (Cooking and Dessert, distinct).

Mr. R. A. Whiting, Dargate House, Faversham: Gold Medal.

Mr. H. T. Mason, Hampton Hill, Middlesex: Silver-gilt Hogg Medal.

Mr. E. W. Caddick, Upper Caradoc, Ross, Hereford: Silver-gilt Knightian Medal.

Class 21.—Apples, 12 baskets of (6 Cooking and 6 Dessert, distinct).

Mr. A. E. Mason, Rectory Farm, Hampton Hill: Silver-gilt Medal presented by the Fruiterers' Company.

Swanley Horticultural College, Kent: Silver Knightian Medal.

Mr. H. Lumley Webb, Sittingbourne: Silver Banksian Medal.

Class 22.—Pears, 6 baskets of, distinct.

No entry.

DIVISION IV.

Fruits grown entirely in the open air.

Open to Gardeners and Amateurs only.

Nurserymen and Market Gardeners excluded.

Exhibitors of Apples or Pears in Division IV. are excluded from Division VI.

NOTE.—Exhibitors may compete in one class only of the Classes 23, 24, 25; of 28, 29, 30, 31.

Class 23.—Apples, 24 dishes distinct, 16 Cooking, 8 Dessert. The latter to be placed in the front row.

First Prize, Hog Medal and £5; Second, £3; Third, £2.

1. Colonel A. C. Borton.

2. Sir Marcus Samuel, Bart.

Equal 3. { C. R. Adeane, Esq., Babraham Hall, Cambridge
(gr. R. Alderman).
Mr. H. Whiteley, St. Marychurch, Torquay.

Extra Prize. C. Gurney, Esq., Henlow Grange, Biggleswade (gr. A. Carlisle).

Class 24.—Apples, 18 dishes distinct, 12 Cooking, 6 Dessert. The latter to be placed in the front row.

First Prize, £3; Second, £2; Third, £1.

1. C. A. Cain, Esq.

2. J. G. Williams, Esq., Pendley Manor, Tring (gr. F. G. Gerrish).

3. A. P. Brandt, Esq., Bletchingley Castle, Surrey (gr. J. W. Barks).

Class 25.—Apples, 12 dishes distinct, 8 Cooking, 4 Dessert. The latter to be placed in the front row.

First Prize, £2; Second, £1; Third, 15s.

1. Major Powell-Cotton.

2. J. Liddell, Esq., Sherfield Manor, Basingstoke (gr. R. Learmouth).

3. Rt. Hon. W. H. Long, Rood Ashton, Trowbridge (gr. W. Strugnell).

Class 26.—Cooking Apples, 6 dishes distinct.

First Prize, £1; Second, 15s.

1. Colonel A. C. Borton.

2. C. Gurney, Esq.

Class 27.—Dessert Apples, 6 dishes distinct.

First Prize, £1; Second, 15s.

1. Colonel A. C. Borton.

2. C. Gurney, Esq.

Class 28.—Dessert Pears, 18 dishes distinct.

First Prize, Hogg Medal and £2; Second, £2; Third, £1.

1. Sir Marcus Samuel, Bart.
2. Colonel A. C. Borton.

Class 29.—Dessert Pears, 12 dishes distinct.

First Prize, £2; Second, £1; Third, 15s.

1. Major Powell-Cotton.
2. C. A. Cain, Esq.

Class 30.—Dessert Pears, 9 dishes distinct.

First Prize, £1 10s.; Second, 17s. 6d.

1. Rt. Hon. W. H. Long.
2. A. P. Brandt, Esq.

Class 31.—Dessert Pears, 6 dishes distinct.

First Prize, £1; Second, 15s.

1. C. Gurney, Esq.
2. The American Ambassador, Wrest Park, Amptill (gr. G. Mackinlay).

Class 32.—Stewing Pears, 3 dishes distinct.

First Prize, 15s.; Second, 10s.

1. Rt. Hon. W. H. Long.
2. Major Powell-Cotton

Class 33.—Plums, 3 dishes distinct.

First Prize, £1; Second, 10s.

1. Lord Howard de Walden.
 2. C. H. Berners, Esq., Woolverstone Park, Ipswich (gr. W. Messenger).
- Extra Prize. Sir Jeremiah Colman, Bart., V.M.H., Gatton Park, Surrey (gr. J. Collier).
- Extra Prize. Mrs. Bankes, Kingston Lacy, Wimborne, Dorset (gr. J. Hill).

Class 34.—Damsons, or Bullaces, 3 dishes distinct.

First Prize, 10s.; Second, 7s. 6d.

1. Colonel A. C. Borton.
2. No award.

Class 35.—Morello Cherries, 50 fruits.

First Prize, 7s.; Second, 5s.

1. J. G. Williams, Esq.
2. Mr. T. W. Birkinshaw, Hatley Park Gardens, Sandy, Beds.

DIVISION V.

Special District County Prizes.

Open to Gardeners and Amateurs only.

(In this Division all fruit must have been grown entirely in the open).

N.B.—Exhibitors in Division V. must not compete in Divisions II. or III., or in Classes 1, 2, 3, 4, 13, 23, 24, 25, 26, 28, 29, 30.

Class AA.—Apples, six dishes distinct 4 Cooking, 2 Dessert.

First Prize, £1 and Third-Class Single Fare from Exhibitor's nearest railway station to London; Second Prize, 15s. and Railway Fare as above.

BB.—Dessert Pears, six dishes distinct.

First Prize, £1 10s. and Railway Fare as above; Second Prize, £1 and Railway Fare as above.

In the event of the same Exhibitor being successful in both Classes AA and BB only one Railway Fare is paid; and no Railway Fare is paid if the fruit is sent up for the Society's officers to unpack and stage.

Class 36.—Open only to Kent Growers.

- | | | |
|-----|---|--|
| AA. | { | 1. W. E. S. Erle Drax, Esq., Olantigh Towers, Wye (gr. J. Bond). |
| | | 2. H. G. Kleinwort, Esq., Wierton Place, Maidstone (gr. B. J. Mercer). |
| BB. | { | 1. W. E. S. Erle Drax, Esq. |
| | | 2. No award. |

Class 37.—Open only to Growers in Surrey, Sussex, Hants, Dorset, Somerset, Devon, and Cornwall.

- | | | |
|-----|---|--|
| AA. | { | 1. Duke of Richmond and Gordon, Goodwood, Sussex (gr. F. Brock). |
| | | 2. J. Cobb, Esq., Ferndale, Teignmouth, Devon. |
| BB. | { | 1. F. J. B. Wingfield-Digby, Esq., Sherborne Castle, Dorset (gr. T. Turton). |
| | | 2. C. H. Combe, Esq., Cobham Park, Surrey (gr. A. Tidy). |

Class 38.—Open only to Growers in Wilts, Gloucester, Oxford, Bucks, Berks, Beds, Herts, and Middlesex.

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|-----|---|---|
| AA. | { | 1. Earl of Suffolk, Malmesbury, Wilts (gr. T. J. Finch). |
| | | 2. J. B. Fortescue, Esq., Dropmore, Maidenhead (gr. C. Page). |
| BB. | { | 1. Lord Hillingdon, Hillingdon Court, Uxbridge (gr. A. R. Allan). |
| | | 2. Viscount Enfield, Wrotham Park, Barnet (gr. H. Markham). |

Class 39.—Open only to Growers in Essex, Suffolk, Norfolk, Cambridge, Hunts, and Rutland.

- AA. { 1. Col. B. J. Petre, Westwick House, Norwich (gr. G. D. Davidson).
2. Hon. W. Lowther, Campsea Ash, Suffolk (gr. A. Andrews).
- BB. { 1. Col. B. J. Petre.
2. C. H. Berners, Esq.

Class 40.—Open only to Growers in Lincoln, Northampton, Warwick, Leicester, Notts, Derby, Staffs, Shropshire, and Cheshire.

- AA. { 1. Duke of Portland, Welbeck Abbey, Worksop (gr. J. Gibson).
2. F. Bibby, Esq., Hardwicke Grange, Shrewsbury (gr. Taylor).
- BB. { 1. Duke of Portland.
2. F. Bibby, Esq.

Class 41.—Open only to Growers in Worcester, Hereford, Monmouth, Glamorgan, Carnarthen, and Pembroke.

- AA. { 1. F. Paget Norbury, Esq., The Norrest, Malvern.
2. No award.
- BB. No entry.

Class 42.—Open only to Growers in other Counties of Wales.

- AA. { 1. Col. Cornwallis-West, Ruthin Castle, N. Wales (gr. H. Forder).
2. No award.
- BB. { 1. Col. Cornwallis-West.
2. No award.

Class 43.—Open only to Growers in the six northern counties of England, and in the Isle of Man.

- AA. { 1. J. Brennand, Esq., Baldersby Park, Thirsk (gr. J. E. Hathaway).
2. No award.
- BB. { 1. J. Brennand, Esq.
2. No award.

Class 44.—Open only to Growers in Scotland.

- AA. { 1. Col. Gordon, Threave House, Castle Douglas (gr. J. Duff).
2. No award.
- BB. No entry.

Class 45.—Open only to Growers in Ireland.

- AA. { 1. Earl of Bessborough, Piltown, Co. Kilkenny (gr. T. E. Tomalin).
2. No award.
- BB. No entry.

Class 46.—Open only to Growers in the Channel Islands.
No entry.

DIVISION VI.

Single Dishes of Fruit Grown Entirely in the Open Air.

Six Fruits to a Dish.

Open to Gardeners and Amateurs only.
Nurserymen and Market Gardeners excluded.

Prizes in each Class, except 72, 73, 103, 140 and 141, as follows :
First Prize, 7s. ; Second Prize, 5s.

CHOICE DESSERT APPLES.

N.B.—The Judges are instructed to prefer quality, colour, and finish to mere size.

Class 47.—Adams' Pearmain.

1. Earl of Devon, Powderham Castle, Exeter (gr. T. H. Bolton).
2. Lord Howard de Walden.

Class 48.—Allington Pippin.

1. Earl Stanhope.
2. W. E. S. Erle Drax, Esq.

Class 49.—American Mother.

1. W. E. S. Erle Drax, Esq.
2. Mr. A. Basile, Woburn Park Gardens, Weybridge.

Class 50.—Belle de Boskoop.

1. Mr. A. Basile.
2. Earl of Lytton, Knebworth House, Herts (gr. H. Brotherston).

Class 51.—Ben's Red.

1. Mrs. R. Sauber, Preston Hall, Aylesford, Kent (gr. E. King).
2. Rev. H. A. Bull, Wellington House, Westgate-on-Sea (gr. F. King).

Class 52.—Blenheim Orange.

1. C. O. Walter, Esq., Ickleton House, Wantage.
2. Earl Stanhope.

Class 53.—Charles Ross.

1. Rev. H. A. Bull.
2. Mr. A. Basile.

Class 54.—Christmas Pearmain.

1. H. G. Kleinwort, Esq.
2. Lord Howard de Walden.

Class 55.—Claygate Pearmain.

1. Lord Foley, Ruxley Lodge, Claygate, Surrey (gr. H. O. Gardner).
2. C. O. Walter, Esq.

Class 56.—Coronation.

1. J. Copp, Esq.
2. W. E. S. Erle Drax, Esq.

Class 57.—Cox's Orange.

1. Rev. G. H. Engleheart, Little Clarendon, Dinton, Salisbury.
2. Col. Hon. C. Harbord, Gunton Park, Norwich (gr. W. Allan).

Class 58.—Duke of Devonshire.

1. Col. B. J. Petre.
2. W. A. Voss, Esq., Rayleigh, Essex.

Class 59.—Egremont Russet.

1. W. E. S. Erle Drax, Esq.
2. Earl of Devon.

Class 60.—Houblon.

1. J. Brennand, Esq.
2. J. B. Fortescue, Esq.

Class 61.—James Grieve.

1. F. Paget Norbury, Esq.
2. Mrs. R. Sauber.

Class 62.—King of Tompkins County.

1. Duke of Richmond and Gordon.
2. C. H. Combe, Esq.

Class 63.—Lord Hindlip.

1. R. M. Whiting, Esq., Credenhill, Hereford.
2. W. E. S. Erle Drax, Esq.

Class 64.—Margil.

1. C. O. Walter, Esq.
2. O. E. d'Avigdor-Goldsmid, Esq.

Class 65.—Ribston Pippin.

1. H. Edgell, Esq., Hickling, Norwich.
2. Col. B. J. Petre.

Class 66.—Rival.

1. Mr. A. Basile.
2. Col. Hon. C. Harbord.

Class 67.—Ross Nonpareil.

1. Mrs. R. Sauber.
2. No award.

Class 68.—St. Edmund's Pippin.

1. F. J. B. Wingfield-Digby, Esq.
2. J. Copp, Esq.

Class 69.—St. Everard.

No entry.

Class 70.—Wealthy.

1. Mr. A. Basile.
2. J. Vivian, Esq., Meadowside, Hayle, Cornwall.

Class 71.—William Crump.

1. Earl of Lytton.
2. Earl Beauchamp, Madresfield Court, Malvern (gr. W. Crump).

Class 72.—8 Fruits of any early variety, not included above, fit for use.

Four prizes, 7s., 6s., 5s., 4s.

1. E. G. Mocatta, Esq., Woburn Place, Addlestone (gr. T. Stevenson).
2. J. Cobb, Esq.
3. C. H. Berners, Esq.
4. Duke of Richmond and Gordon.

Class 73.—8 Fruits of any late variety, not included above.

Four Prizes, 7s., 6s., 5s., 4s.

1. Hon. W. Lowther.
2. F. J. B. Wingfield-Digby, Esq.
3. C. H. Berners, Esq.
4. Earl Stanhope.

CHOICE COOKING APPLES.

Class 74.—Annie Elizabeth.

1. H. G. Kleinwort, Esq.
2. F. J. B. Wingfield-Digby, Esq.

Class 75.—Beauty of Kent.

1. Sir Jeremiah Colman.
2. J. B. Fortescue, Esq.

Class 76.—Bismarck.

1. J. Vivian, Esq.
2. Hon. H. Lowther.

Class 77.—Bramley's Seedling.

1. J. Vivian, Esq.
2. Mr. A. Basile.

Class 78.—Byford Wonder.

1. J. Lee, Esq., Higher Bebington.
2. J. Copp, Esq.

Class 79.—Dunelow's Seedling, *syn.* Wellington, and Normanton Wonder.

1. J. B. Fortescue, Esq.
2. C. O. Walter, Esq.

Class 80.—Ecklinville.

1. W. E. S. Erle Drax, Esq.
2. E. G. Mocatta, Esq.

Class 81.—Edward VII.

1. R. M. Whiting, Esq.
2. J. Copp, Esq.

Class 82.—Emneth Early, *syn.* Early Victoria.
No award.

Class 83.—Emperor Alexander.

1. J. Vivian, Esq.
2. Earl of Suffolk.

Class 84.—Gascoyne's Scarlet.

1. Col. B. J. Petre.
2. W. E. S. Erle Drax, Esq.

Class 85.—Golden Noble.

1. F. J. B. Wingfield-Digby, Esq.
2. J. Copp, Esq.

Class 86.—Grenadier.

1. J. Vivian, Esq.
2. W. E. S. Erle Drax, Esq.

Class 87.—Hambling's Seedling.

1. Earl of Bessborough.
2. W. E. S. Erle Drax, Esq.

Class 88.—Lady Henniker.

1. Mr. A. Basile.
2. Sir George Farwell Knowle, Dunster, Somerset (gr. F. Little).

Class 89.—Lane's Prince Albert.

1. E. G. Mocatta, Esq.
2. Col. B. J. Petre.

Class 90.—Lord Derby.

1. H. G. Kleinwort, Esq.
2. J. Vivian, Esq.

Class 91.—Mère de Ménage.

1. J. Vivian, Esq.
2. Viscount Enfield.

Class 92.—Newton Wonder.

1. Hon. W. Lowther.
2. Mr. A. Basile.

Class 93.—Norfolk Beauty.

1. Col. Hon. C. Harbord.
2. Hon. W. Lowther.

Class 94.—Peasgood's Nonesuch.

1. Hon. W. Lowther.
2. J. Vivian, Esq.

Class 95.—Potts' Seedling.

1. Mrs. F. W. Platt, Ken View, View Road, Highgate.
2. F. J. B. Wingfield-Digby, Esq.

Class 96.—Revd. W. Wilks.

No entry.

Class 97.—Royal Jubilee.

1. F. Bibby, Esq.
2. Col. B. J. Petre.

Class 98.—Scarlet Victoria.

No entry.

Class 99.—Stirling Castle.

1. J. Copp, Esq.
2. Earl of Devon.

Class 100.—The Queen.

1. W. E. S. Erle Drax, Esq.
2. J. Vivian, Esq.

Class 101.—Tower of Glamis.

1. Earl of Bessborough.
2. F. J. B. Wingfield-Digby, Esq.

Class 102.—Warner's King.

1. Hon. W. Lowther.
2. E. G. Mocatta, Esq.

Class 103.—8 Fruits of any variety not included above.

Four Prizes, 7s., 6s., 5s., 4s.

1. W. B. M. Bird, Esq., Earham House, Chichester (gr. A. Gooding).
2. B. E. Richardson, Esq., Hill House, Stanstead Abbots (gr. E. Colman).
3. Earl of Devon.
4. H. G. Kleinwort, Esq.

CHOICE DESSERT PEARS.

Class 104.—Beurré Alexander Lucas.

1. Mr. A. Basile.
2. F. J. B. Wingfield-Digby, Esq.

Class 105.—Beurré d'Amanlis.

No award.

Class 106.—Beurré d'Anjou.

1. C. H. Combe, Esq.
2. J. T. Charlesworth, Esq., Nutfield Court, Redhill (gr. T. W. Herbert).

Class 107.—Beurré d'Avalon (*syn.* Porch's Beurré, and Glastonbury.)

No entry.

Class 108.—Beurré Bosc.

1. Mr. A. Basile.
2. F. Bibby, Esq.

Class 109.—Beurré de Naghan.

No entry.

Class 110.—Beurré Dumont.

1. Mr. A. Basile.
2. No award.

Class 111.—Beurré Hardy.

1. Lord Hillingdon (gr. A. R. Allan).
2. Mr. A. Basile.

Class 112.—Beurré Perran.

No entry.

Class 113.—Beurré Superfin.

1. Mr. A. Basile.
2. Lord Hillingdon (gr. A. R. Allan).

Class 114.—Blickling.

1. Col. Hon. C. Harbord.
2. No award.

Class 115.—Charles Ernest.

1. Mr. A. Basile.
2. F. J. B. Wingfield-Digby, Esq.

Class 116.—Comte de Lamy.

1. J. T. Charlesworth, Esq.
2. Lord Hillingdon (gr. A. R. Allan).

Class 117.—Conference.

1. Col. B. J. Petre.
2. Mrs. Bankes.

Class 118.—Directeur Hardy.

1. C. H. Berners, Esq.
2. F. Bibby, Esq.

Class 119.—Doyenné du Comice.

1. Col. B. J. Petre.
2. F. J. B. Wingfield-Digby, Esq.

Class 120.—Durondeau.

1. Col. B. J. Petre.
2. Col. Hon. C. Harbord.

Class 121.—Emile d'Heyst.

1. Duke of Newcastle.
2. Col. B. J. Petre.

Class 122.—Fondante d'Automne.

1. Col. Hon. C. Harbord.
2. Lord Hillingdon (gr. A. R. Allan).

Class 123.—Fondante de Thiriot.

1. Lord Hillingdon (gr. A. R. Allan).
2. J. B. Fortescue, Esq.

Class 124.—Glou Morceau.

1. Col. Hon. C. Harbord.
2. Mr. A. Basile.

Class 125.—Joséphine de Malines.

1. Col. Hon. C. Harbord.
2. F. J. B. Wingfield-Digby, Esq.

Class 126.—Le Brun.

1. Mr. A. Basile.
2. No award.

Class 127.—Le Lectier.

1. Lord Howard de Walden.
2. C. H. Combe, Esq.

Class 128.—Louise Bonne of Jersey.

1. W. E. S. Erle Drax, Esq.
2. Col. Hon. C. Harbord.

Class 129.—Marie Benoist.

1. C. H. Berners, Esq.
2. Mr. A. Basile.

Class 130.—Marie Louise.

1. Col. Hon. C. Harbord.
2. Lady Tate.

Class 131.—Nouvelle Fulvie.

1. Mrs. Bankes.
2. Col. J. B. Petre.

Class 132.—Olivier des Serres.

1. Lord Hillingdon (gr. A. R. Allan).
2. F. Bibby, Esq.

Class 133.—Pitmaston Duchess.

1. Mrs. R. Sauber.
2. Hon. W. Lowther.

Class 134.—President Barabé.

1. Col. Hon. C. Harbord.
2. Lord Hillingdon (gr. A. R. Allan).

Class 135.—Santa Claus.

No entry.

Class 136.—Souvenir du Congrès.

1. J. B. Fortescue, Esq.
2. Mr. J. Edmonds, Bestwood Gardens, Arnold, Notts.

Class 137.—Thompson.

1. J. B. Fortescue, Esq.
2. Col. Hon. C. Harbord.

Class 138.—Triomphe de Vienne.

1. W. E. S. Erle Drax, Esq.
2. Lord Hillingdon (gr. J. Shelton).

Class 139.—Winter Nelis.

1. Lord Foley.
2. Col. Hon. C. Harbord.

Class 140.—8 Fruits of any early variety not included above.

Four Prizes, 7s., 6s., 5s., 4s.

1. B. E. Richardson, Esq.
2. Mr. T. W. Birkinshaw.
3. F. J. B. Wingfield-Digby, Esq.
4. Duke of Rutland, Belvoir Castle, Grantham (gr. W. H. Divers).

Class 141.—8 Fruits of any late variety not included above.

Four Prizes, 7s., 6s., 5s., 4s.

1. Mr. A. Basile.
2. Lord Foley.
3. Lord Howard de Walden.
4. Mrs. Bankes.

FRUIT COMPETITION FOR AFFILIATED SOCIETIES.

Six Dishes, distinct, Cooking Apples; Six Dishes, distinct, Dessert Apples; Six Dishes, distinct, Dessert Pears. Six Fruits to each dish. *Affiliated Societies.* It is stipulated that no two Societies may combine, and that each Society competing collects all the specimens shown from amongst their own members only, and not from outside. Eight days' notice must be given of intention to compete.

First, Challenge Cup to be held for 12 months, and Silver-gilt Knightian Medal. *Second*, Silver-gilt Banksian Medal.

The Cup may be won once only in three years by any one Society; but the Winners may compete for any other prizes offered in this Class. If the same Societies which won the Challenge Cup in 1909 and 1910 again exhibit and either is considered by the Judges to be 1st, thus again establishing the excellence of their Society's exhibit, a smaller Silver Cup will be awarded by the Council instead of the Medal offered as the 2nd Prize, but in future years the winning Society must win again in the immediately following year in order to establish a claim for the smaller Cup in place of the Silver-gilt Knightian Medal.

Silver Challenge Cup: Ipswich and District Gardeners' and Amateurs' Assoc.: Sec., F. W. Salmon, 65 Brook Hall Road, Ipswich.

Silver Cup: East Anglian Horticultural Club: Sec., W. I. Wallis, 12 Royal Arcade, Norwich.

Silver Knightian Medal: Colchester and District Gardeners' Assoc.: Sec., W. H. Tanner, 43 East Street. Colchester.

REPORT OF THE ANNUAL CONFERENCE OF AFFILIATED SOCIETIES AND OF THE UNION OF MUTUAL IMPROVEMENT SOCIETIES.

The Annual Conference was held on October 11 at the Royal Horticultural Hall, the Rev. W. Wilks, M.A., Secretary of the R.H.S., in the chair.

1. The Agenda being somewhat lengthy, the meeting asked the chairman to begin by reading the paper he had prepared on "Some Difficulties in Flower-Show Schedules" (p. 497).

Discussion.—Mr. James Douglas, V.M.H., said he thought it was impracticable to limit the amount of money taken by any one exhibitor at a small country show, and that the term "own foliage" was one to be avoided for exhibits of Carnations, owing to the value of the

foliage for cuttings. For greater accuracy in differentiating the Picotee from the Carnation in schedules, he thought the term "Picotee form of Carnation" would be better than merely "Picotee." He emphasized the importance of judges understanding the wording of a schedule, and the need of knowledge of the definitions under which different plants fall for show purposes, citing an instance of a collection of annuals being disqualified at a show because an Ageratum was included in it, whereas Thompson's "Gardener's Assistant" and Nicholson's "Dictionary of Gardening" both give Ageratum as an annual. [NOTE.—Nicholson directs Ageratums to be propagated by cuttings, and Thompson says in one place, "They are usually treated as annuals," and in another speaks of keeping them through the winter by cuttings. It is evident therefore that neither authority really regards Ageratums as annuals.]

Mr. Cawte called attention to the tendency of judges to give awards to exhibits of Sweet Peas staged with fern-leaves and other alien foliage, when the wording of the schedule asked only for Sweet Peas.

Mr. Wilks replied that:—As regards the placing of a limit upon the amount of money taken by one exhibitor at any one show, this practice has been adopted with success for a very large country show of nine different combined parishes, where a limit of £2 maximum was fixed. The judges are asked to indicate to the Committee the number of points for the various classes in which any one exhibitor is successful. He will have money value only up to the maximum if he has exceeded this, and for the remainder he holds the honour of winning the prize, but does not receive the actual money, which goes to the exhibitor next in sequence, and so on.

The word "species" cannot be used strictly for "kinds"; peaches and nectarines, for example, are not only the same species, but absolutely the same plant, a peach-stone often producing a nectarine, and a tree of either occasionally bearing a fruit half peach and half nectarine.

In the case of Sweet Peas staged with foliage other than that of Sweet Peas, the prize should not have been given; or, to treat such cases most leniently, the judges should remove the foliage before considering the exhibit.

2. The following letter concerning the destruction of queen wasps was read:—

Brewood and District Horticultural Society, Stafford :
Sept. 18, 1911.

DEAR SIR,—It has been suggested by one of our leading bee-keepers that united action be taken by all Horticultural Societies in the Kingdom for the destruction of queen wasps in the spring of the year 1912.

Yours truly,
ASHTON VEALE.

The Chairman said that the wisdom of this suggestion would commend itself to the members of all horticultural societies, especially

those who are fruit growers, and hoped that attention to this detail would result from the hint given by the Brewood Society.

3. *What should "Union" mean?* Mr. Mark Webster, of Beckenham, introduced a discussion on this subject by the following remarks:—

Before proceeding to consider what union should mean, it might be well to try to see what union does mean, under present conditions.

When Mr. Boshier and others, some few years ago, advocated the uniting of Horticultural Mutual Improvement Societies, some of us thought, if the suggestion could be realized, what a splendid means it would afford of strengthening and fixing permanently the numerous societies for mutual improvement which had just about that time been springing up throughout the whole country.

Whether they all still exist there seems to be no means at present of ascertaining, as there is an entire lack of communication among them.

The Secretary of the Royal Horticultural Society has kindly granted me the information that there are about three hundred societies in affiliation, organized for the promotion of shows, &c., while there are only eight enrolled separately under the Union of Horticultural Mutual Improvement Societies, who hold meetings for lectures and discussion. The names of the eight, as published in the R.H.S. List of Fellows, are:—

Battersea Gardeners.	Browning Settlement.
Loughborough Gardeners.	Manchester Horticultural.
Preston Gardeners.	Wisley Horticultural.
Wimbledon Gardeners.	Trawden Horticultural.

These Societies contribute annually a cash payment of 5s., which is equal to about 25 per cent. of the full affiliation fee, although they are not entitled to participate in the privileges granted to societies in affiliation.

I am not aware that any of the fee of societies in affiliation is devoted to the interests or objects of societies enrolled under the Union of Horticultural Mutual Improvement Societies.

Suppose each affiliated society contributed 5s. for enrolment in the Union, the total would amount to £75, plus the £2 contributed by the eight societies now in union, giving in all £77 per annum. Possibly that arrangement might not meet with the approval of societies affiliated for the promotion of shows only; yet it could scarcely be considered unfair to divide equally the annual affiliation fee of societies who not only promote shows, but also lectures and discussions for mutual improvement.

The Society to which I belong, and have the honour to represent, was affiliated long before "Union" was suggested. We endeavour to educate the general public by a show, and the gardener by meetings for lectures and discussion.

We therefore share in the various privileges granted to societies

affiliated (which it is not necessary I should enumerate), plus, and free gratis, enrolment and membership in the Union of Horticultural Mutual Improvement Societies. Beckenham, therefore, has no grievance; and I wish it to be thoroughly understood that anything I may say is in no captious spirit.

The President and Council of the Royal Horticultural Society have been good enough to acknowledge the good work done by Mutual Improvement Societies, with an expression of the desire to promote and assist them in every reasonable way.

They have also drawn up a code of regulations, published in the Book of Arrangements for the current year, which include a register of societies and a register of lecturers, with copies of the rules and syllabus of each society in union, which are kept open for inspection by the secretary of any society in union on application to the Secretary. Printed lectures are also offered on hire, at fees ranging from 3s. to 7s. 6d. each lecture, with or without lantern slides.

To sum up, union as at present constituted means: that each individual society shall separately join itself, on defined conditions—viz., affiliation or union—with the Royal Horticultural Society.

Association in any degree with a Society holding, as it does, such a supreme position in the horticultural world cannot be over-estimated, yet I venture to think union should mean even something more than that.

The Beckenham and Croydon Societies are each affiliated, and they are therefore enrolled in the Union of Horticultural Mutual Improvement Societies. Each holds meetings regularly for lectures and discussion. I believe Croydon meets on Tuesday evenings, and Beckenham on Fridays.* The places of meeting are only four miles apart. Visits have occasionally been made, when some special subject has been introduced, and then by direct, or special invitation. Since the introduction of "Union," I have never heard any suggestion for freer intercommunication.

The question I should particularly like to raise is: Why should not every member of any society in the Union have the privilege of attending any lectures or discussions of any society similarly enrolled? Personally I think this is the least union should mean.

Under the regulations—page 93, Book of Arrangements—No. I. reads: "That a register of Horticultural Mutual Improvement Societies shall be kept at Vincent Square"; and No. III.: "That a copy of the Rules and Regulations and of the current season's Arrangements or Syllabus of each Mutual Improvement Society shall be kept at Vincent Square." Quite right; but why, I should like to ask, at Vincent Square *only*?

There are now eight societies in union. If each society posted its complete rules and regulations, with current season's arrangements, to the other seven societies—the sole cost need not be more than 7d. for postage—a mutual interest would at once be created, and the fusion of the aims and interests of eight societies who are now possibly

unknown to each other, even by name, might be the means of the institution of a national federation.

As I have before pointed out, exhibiting societies affiliated to the Royal Horticultural Society share in all the benefits that accrue to societies under the union. Why should not members of Horticultural Mutual Improvement Societies enrolled in union be granted an equal privilege, at least, of attending the fortnightly lectures? The time is not convenient, but possibly lectures might be specially arranged during the winter months, at such time in the evening that gardeners might be able to attend. The only objection that could be raised would be that only those situated within a limited area could benefit. But if the hope of federation of every horticultural association in the kingdom were to be realized, courses of lectures could then be arranged in every large centre.

Gardener members of Mutual Improvement Societies are generally of a more or less studious turn of mind. Probably the use of the library at Vincent Square would be appreciated if permission to use it were granted. It would afford intending purchasers of books an opportunity of judging their value; lecturers and students might also find it a useful source of reference. The practice of scientific gardening is impossible without books.

Our Society at Beckenham is particularly fortunate in possessing a library where books can be read or borrowed. When it is decided to purchase new books, members suggest the additions to be made, a sub-committee finally deciding.

Good works on gardening are generally expensive, and the wages of a gardener do not often allow him the privilege of possessing all he may desire; while young gardeners, moving about from place to place, often find them a burden when changing situations.

Suppose, under the auspices of the Royal Horticultural Society, a circulating library could be instituted where books could be borrowed for a small payment—or payment of carriage—for short terms; members of societies, particularly in outlying districts, might then see some possibility of real benefit, and decide to unite and share those benefits which the strength of unity can give.

Discussion.—Mr. Gill, of Wimbledon, said that the circulating lantern lectures were too expensive for small societies, and that the list of lecturers included names of incapable men. He suggested the formation of a circulating library by the R.H.S. for the use of societies. He also said that the practise of his Society at Wimbledon was to give open welcome to members of other similar societies visiting it.

Mr. Boshier, of the Croydon Society, and Mr. Thornton, of the Beckenham Society, said that visitors were made welcome at their meetings.

The Chairman replied that the object which the Council of the R.H.S. had in view in attempting to establish a Union of Mutual Improvement Societies was to establish a union between *them* themselves and not to unite them to the R.H.S.—that was more the purpose

of affiliation. Whilst agreeing with much that Mr. Webster had said, he could not help feeling that he had rather mixed up the two very distinct subjects of affiliation *with* the R.H.S., and the Union *of* and between Mutual Improvement Societies. He thought it was impossible for the R.H.S. to make a rule admitting members of one Society to the meetings of another Society to which they did not subscribe. That was a question entirely for the societies themselves. The R.H.S. Library is open for members of allied societies to consult the books therein, under the rules of the Library; a circulating library was a question which he must bring before the Council.

[Extract from the Minutes of the Council; meeting held on October 24, 1911:—

“The Secretary reported that the Affiliated Societies’ Conference had been quite satisfactory. The Conference requested the Council “to establish a circulating library for their use. The Council “thought that over three hundred societies applying for the volumes “would lead to a demand which it would be difficult to deal with. “They therefore regretted to be unable to comply with this “request.”]

The names and addresses of the lecturers appearing in the official list had been furnished by the affiliated societies themselves, in response to a circular issued by the R.H.S. asking that “only the names of GOOD LECTURERS should be given.” As regards the limitation of the benefits afforded to “societies in union,” as compared with those in “affiliation,” it must be remembered that the privileges held by the former were framed and accepted at the first Conference held in 1907, and were added to the privileges of societies “affiliated” at the express request of the Conference. He promised to reconsider the prices for the hire of lantern slides, although he had not any very sanguine hope that a revision would create any greater demand.

The Chairman being compelled to leave, Mr. James Douglas, V.M.H., here took the chair.

4. *County Flower Shows*.—Mr. Cawte, introducing this subject, thought that it would be very helpful to horticulture in the provinces if occasionally the summer show in London were forgone in favour of a show at important provincial centres, and outlined a scheme for the formation of committees composed of members of the horticultural societies in the areas concerned, the finances to be drawn from residents in such areas, the R.H.S. to extend its support and award its medals. Discussion following showed (1) the difficulty of arranging meetings of committees in wide-spreading districts; (2) the confusion arising in all quarters from the interruption at midsummer of the Society’s regular fortnightly sequence of shows; and (3) the discouraging effect of the ever-increasing demands upon the pockets of landowners and other plant-loving people.

The Chairman replied that the R.H.S. entertained most favourable feelings towards flower shows in the provinces, and frequently (when

invited to do so) sent a deputation of the Council to the more important of them to award medals. The R.H.S. had, however, had a most unhappy experience in the promotion of country shows, as, between 1867 and 1873, seven shows were held at the most important towns in the kingdom and were attended with heavy and serious loss, the last one at Liverpool showing a deficit of about £1,500, so that their organization had had to be abandoned.

A vote of thanks to the Chairman closed the proceedings.

GENERAL MEETING.

OCTOBER 24, 1911.

Dr. A. B. RENDLE, F.R.S., F.L.S., in the Chair.

Fellows elected (37).—Mrs. J. E. Bates, W. E. Boucher, W. W. Caney, C. G. H. Coombs, S. R. Cope, J. E. Cort, Mrs. R. Stafford Cripps, Mrs. J. L. Cross, Mrs. Mordaunt Edwards, Hon. Mrs. Herbert Foster, Mrs. Ernest Greg, W. Haddow, H. Halton, J. H. A. Hart, M.A., W. H. Hawthorn, R. Hicks, W. Kirk, Mrs. T. M. Kitchin, Mrs. A. E. Madge, Mrs. O. Magniac, Mrs. H. S. Mortimer, F. Mounsey, Mrs. Patterson, Mrs. J. Perry, A. C. Pilkington, Mrs. R. Price, L. A. Selby-Bigge, Miss K. M. Sharpe, Frederic Smith, Mrs. W. Howard Stables, Miss Sugden, Miss H. M. Tweedie, Mrs. A. Walker, Maurice L. Webb, B.A., J. Beaver White, Laurence G. Williamson, Mrs. Frank Wynne.

Fellows resident abroad (2).—H. O. Bower (Melbourne, Australia), General Sir Archibald Hunter (Gibraltar).

Society affiliated (1).—Willesden and District Horticultural Society.

A lecture on "The Origin and Structure of Flowering Plants in Dry Situations" was given by the Rev. Professor G. Henslow, M.A., F.L.S., V.M.H. (see p. 505).

GENERAL MEETING.

NOVEMBER 7, 1911.

Sir ALBERT KAYE ROLLIT, D.C.L., LL.D., in the Chair.

Fellows elected (47).—Colonel Hon. E. Baring, H. E. Beale, W. Bonsall, Miss E. F. Bosley, R. T. Bridge, Miss L. Callender, J. A. Campbell, J. Carr, J.P., Miss H. Clerk, F. E. Cripps, E. H. L. Davidson, H. M. Elford, G. M. Errington, Mrs. W. J. Evans, W. Felstead, H. E. Garford, C. A. Gibbs, Mrs. W. H. Gray, T. B. Grove, Rev. H. A. Hall, J. W. Hart, G. Hartmann, Mrs. Judd, Mrs. Julian, H. E. Kittle, H. G. Kleinwort, E. Krumbholz, A. Lamb, Mrs. Lloyd, Miss E. Lowry, Miss M. Macbeth, A. S. Mackenzie, Mrs. G. Paget, C. A. Paine, M.A., Mrs. P. Phillips, R. Pinnock, Miss M. Ponsonby, Venerable Archdeacon Richardson, Mrs. W. T. Rule, H. G. Ryan,

M. F. Sanders, Mrs. H. Sapte, S. Spittle, F. Street, Lady Ward, Sir George Welby, C.M.G., Miss F. C. Wemyss.

Fellows resident abroad (2).—F. W. Popenoe (California), W. W. G. Richardson (Auckland, N.Z.).

Associate (1).—Miss M. T. Cobbold.

Societies affiliated (2).—Goliur Horticultural Society, St. Mellons, Rumney and District Horticultural Society.

A lecture on "The Cultivation of Figs in Pots" was given by Mr. James Hudson, V.M.H. (see p. 508).

GENERAL MEETING.

NOVEMBER 21, 1911.

Mr. R. C. NOTCURT in the Chair.

Fellows elected (27).—C. Bogle-Smith, Miss J. M. Bourne, Mrs. A. Buckley, J. S. Dallenger, Mrs. H. Douglas, Mrs. de Vesian, Mrs. A. Dodd, Mrs. T. Erskine, Mrs. R. Berney Ficklin, Mrs. Glynn, Miss Handley, Mrs. J. Henderson, Mrs. W. Kennedy, Hon. Mrs. R. Lindsay, N. MacLaine, E. Morrell, Mrs. H. Morris, A. J. Morton, J. Moulton, Dr. F. G. Penrose, The Lady Petre, E. Ricketts, R. F. Ruthven-Smith, R. Smyth, E. Stainton, Mrs. Tryon, Mrs. R. Upcher.

Fellows resident abroad (3).—R. Chenault (Orleans), F. L. Wright (New York), J. N. Zütshi (Morar, India).

A lecture on "The 1912 International Horticultural Exhibition" was given by Mr. Edward White (see p. 515).

It was proposed by Mr. W. A. Bilney, seconded by Mr. Gurney Wilson, and carried that

"Forasmuch as Mr. W. Edgell has neglected to pay his annual subscription as a Fellow for the space of six calendar months, the Fellows assembled in General Meeting this day (November 21, 1911) hereby declare Mr. W. Edgell to have forfeited his rights and privileges as a Fellow of the Royal Horticultural Society, and as a consequence of this resolution under Bye-Law 24 he ceases from this day forward to be a Fellow of the said Society."

GENERAL MEETING.

DECEMBER 5, 1911.

Mr. W. FAWCETT, B.Sc., F.L.S., in the Chair.

Fellows elected (40).—H. R. Aming, Rev. L. C. Barnes, Colonel W. Ironside Bax, P. J. Cobbold, Miss L. Couper, Mrs. H. R. Courtenay, Miss E. Downing, H. G. Elphick, Mrs. Fehling, Rev. F. F. Field, H. Green, Hon. Mrs. F. Guest, F. Haslam, Mrs. W. A. Hiern, Major H. Berkeley Hill, R. T. Hindley, Miss J. Honey, Mrs. Frank Jones, Mrs. B. E. Lawrence, Mrs. Little, Miss L. Maynard, H. Montgomery, E. Vaughan Morgan, H. Nash, Miss Palmer-Lovell,

Miss S. K. Peters, D. J. Powell, H. Reece, W. R. Robins, W. Slack, G. Stocks, G. R. H. Stringer, Mrs. J. Sykes, Miss F. Tatham, Mrs. T. Telfordsmith, Mrs. G. Terrell, W. J. Thomas, Miss D. Vivian, T. O. Walker, W. R. Waters.

Fellows resident abroad (3).—A. K. Basu (Calcutta), V. M. A. Mudaliar (Bangalore), Arthur Yates (Sydney).

Associates (2).—F. Cross, S. C. Sinail.

Societies affiliated (2).—Berkswell, Balsall, and Barston Horticultural Society; Ockham, Ripley, and Wisley Cottage Garden Society.

A lecture on "The Motile Organs of Plants" was given by Professor J. Bretland Farmer, D.Sc., F.R.S., F.L.S.

GENERAL MEETING.

DECEMBER 19, 1911.

Sir TREVOR LAWRENCE, BART., K.C.V.O., V.M.H., in the Chair.

Fellows elected (32).—Miss G. M. Bayne, F. H. Benham, Mrs. H. Chapman, D. D. Coath, G. Lawrence Dunn, Miss A. Edwards, C. Elwell, G. R. Evans, P. W. Evans, E. Ferrario, Miss D. Goddard, Mrs. A. M. Henderson, Mrs. E. Hibbert, A. D. Holland, J. F. Jowitt, W. Kidd, Mrs. Kirk, G. D. Malins, Miss R. Marwood, Mrs. R. Morton, C. J. Parke, Mrs. G. Peterkin, F. G. Selby, Mrs. M. Smith, J. W. Soper, A. H. Ryan Tenison, A. A. Thompson, Mrs. Thorburn, Mrs. W. N. Walker, Miss M. I. Willans, R. Wood, C. M. Wolstenholme.

Fellows resident abroad (2).—F. Roberts (Transvaal), K. V. Tamhankar (Bombay).

Societies affiliated (2).—Bulawayo Horticultural Society, St. Quintin Park Horticultural Society.

SCIENTIFIC COMMITTEE.

SEPTEMBER 12, 1911.

Mr. A. W. HILL, M.A., F.L.S., in the Chair, and four members present.

Bulbophyllum orthoglossum.—Mr. O'Brien, V.M.H., drew attention to this uncommon species, figured in the *Gardeners' Chronicle*, June 20, 1908, p. 406, shown by Sir Jeremiah Colman, Bart., which had been imported from the Philippine Islands.

Gall on Tanacetum, &c.—Mr. J. Fraser, F.L.S., showed specimens of a gall on *Tanacetum vulgare* formed by the fly *Hormomyia tanaceticola*, both on the stem and in the leaf axils. It had been collected on the Thames bank near Richmond. He also showed the fasciated stem of a vegetable marrow which showed about forty ridges. Mr. Fraser remarked concerning the perpetuation of abnormalities that many appeared to depend upon merely local conditions, and could not be perpetuated, *e.g.* although he made cuttings from the abnormal stem of the mint he showed last year (*JOURNAL R.H.S.*, xxxvi. (1910), p. cxviii) with leaves displaced and showing other abnormalities, they had reproduced the normal type entirely this season.

Quince with felted growth.—Mr. Fraser also showed a quince covered with hairy growth, somewhat similar to that seen on the young fruits, but here persisting to a late period, without any obvious cause.

Oats and Barley shooting after harvest.—Mrs. E. Robinson sent specimens of oats and barley making a second growth after the harvest had been cut. The growth sprung from the base of the main stem, and bore flowers at the height of about a foot. They were collected at Limavady, Co. Derry.

SCIENTIFIC COMMITTEE, SEPTEMBER 26, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and nine members present.

Oxalis Ortgiesii.—Mr. Odell showed a well-grown specimen of this Peruvian species from a cool house at Stanmore in a very floriferous condition. See *Gartenflora* (1875), t. 817.

Diseased plants.—Dr. Voelcker, M.A., showed specimens of celery attacked by the fungus *Septoria petroselini* var. *apii*. This disease appears to be becoming increasingly prevalent each year, and, as pointed out earlier in the year in the minutes of this Committee (p. xxxi. see also p. 115) a considerable number of samples of "seed" of celery were attacked. Probably spraying with Bordeaux mixture or

with potassium sulphide from early stages in the plant's growth onwards would keep the disease in check. Dr. Voelcker also showed cabbage leaves badly attacked by the fungus *Phyllosticta brassicae*, causing spotting of the leaves so as to render the plants useless.

Remarkable fruiting of Citrus trifoliata, syn. *Ægle sepiaria*.—Mr. Bowles showed branches of *Citrus trifoliata* (= *Ægle sepiaria*) fruiting remarkably abundantly. In most seasons in his garden the earliest flowers are staminate, followed a little later by some pistillate ones, some of which produce fruits, and the crop is a small one. This season, however, most of the flowers produced at the second flowering were hermaphrodite and practically all produced fruits.

Witches' Broom on Scots Fir.—A remarkable witches' broom on Scots Fir was sent by C. W. Ricketts, Esq., of Foulis Court, Eastleigh. It was a dense growth about 12 inches in diameter. The growth was probably due in the first place to the attack on the tree of a species of *Acidium*, and it had continued for several years, the leaves on the attacked portion being smaller in size than those on the normal shoots.

Rubus innominatus, S. Moore.—Some fruiting shoots of this newly introduced *Rubus*, from China, were shown by the Hon. Vicary Gibbs, under the name of *Rubus Kuntzeanus*. The fruits are insipid, small, and amber and black in colour. See *Gardeners' Chronicle*, October 21, 1905, p. 290, where it is shown that *R. innominatus* and *R. Kuntzeanus* are synonymous.

SCIENTIFIC COMMITTEE, OCTOBER 10, 1911.

Mr. J. T. BENNETT-POË, M.A., V.M.H., in the Chair, and six members present.

Variation in Elm.—Mr. Worsdell, F.L.S., drew attention to the variation which had occurred this year, both at Kew and at Cambridge, in the foliage of *Ulmus glabra*, Miller. At the base of many leaf-blades, from one to three extra small leaflets had developed on the petiole. These, when on the side of the leaf in which the blade is usually less well developed, appeared to be complementary growths, but in several of the leaves the blade was symmetrical. A second variation, of considerable frequency, was seen in the forking of the midribs of the leaves, sometimes to the base, so as to produce apparently two leaves at a node, sometimes less deeply. In some few cases also some of the leaves formed ascidia.

Rudbeckia triloba malformed.—Mr. Worsdell also exhibited an inflorescence of *Rudbeckia triloba*, with foliage leaves developing from the apex, through the centre of the capitulum.

Menthol plant.—Mr. Holmes, F.L.S., showed a specimen of the true Menthol plant from his garden. The plant was derived from one growing in Berlin. It is a form of *Mentha arvensis* called *piperascens*, and is a native of Japan.

Fasciation in Chrysanthemum maximum.—Mr. J. R. Jackson sent an example of a fasciated stem and inflorescence in this plant from Lymptstone. This species appears to be very subject to fasciation.

Onion bulb with lateral growths.—Mr. E. E. Turner sent from Coggeshall, Essex, an Onion bulb having numerous greenish bulbils growing from around the base, so that the original bulb was surrounded at its base by numerous outgrowths. It may possibly have arisen from a second growth being developed after a check imposed by drought.

Cabbage with hairy leaves.—Mr. A. Simmonds sent from Mitcham, Surrey, a cabbage leaf having hairs upon both surfaces, especially upon the veins. The wild form is often hairy, but hairiness appears to be very rare in the cultivated varieties.

Rotting of Narcissus bulbs.—Rev. J. Jacob sent some *Narcissus* bulbs which had been attacked by the fungus *Fusarium bulbigenum*. This was first described in *Grevillea*, vol. xvi. p. 49, but appears not to have been troublesome since.

Apples diseased.—Mr. Rogers sent from Hexworthy some apples with peculiar greenish depressions on the surface, showing a well-marked, brown marginal line, which also limited the spots on the inner side, being there about $\frac{1}{2}$ inch below the surface. The trouble had, apparently, developed in the store, and had occurred in a large number of varieties.

SCIENTIFIC COMMITTEE, OCTOBER 24, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and sixteen members present.

Nerine pudica alba.—Mr. Worsley showed a white-flowered form of what he regarded as *Nerine pudica*, a seedling raised by him some time ago. He also showed ripe fruits of the variegated form of *Vitis heterophylla*.

Various plants.—Mr. Elwes, F.R.S., drew attention to a flower of *Paeonia lutea* from a plant sent out by Messrs. Vilmorin flowering for the second time this year, but now, unlike its first flowering, holding its flowers well above the foliage. Mr. Bowles remarked that he had a form which normally flowered in this way, also from Messrs Vilmorin. Mr. Elwes also showed a plant of *Statice fruticans* (= *arborea*), a Canary Island species, raised from seed, and flowering well within a year of seed-sowing; *Aristea corymbosa*, a woody iridaceous plant from South Africa; and *Stapelia primulina*. [Dr. Perez, of Puerto Orotava, subsequently sent the following note on *Statice fruticans* and an allied *Statice* to Mr. Elwes: "Being a great amateur and admirer of our Canary Statice which no one in England appears to take up, although *S. arborea* obtained a Gold Banksian Medal from the R.H.S. last century, I am taking the liberty of addressing this to you and forward-

ing by registered sample post some seed of both *S. arborea* and *S. frutescens*. Both are very rare Teneriffe plants: *S. arborea* had actually vanished till I rediscovered it through a goat herd in 1906, and *S. frutescens* only occurs in one isolated spot in this island.

"The two plants, though said by botanists to be the same, are very different in appearance at any rate. One is a tall, robust Statice, and the other always dwarfer.

"To ensure successful germination I always carefully extract the seeds, and they come up a week or ten days after sowing. Otherwise I soak them in water till they sink, which generally takes a week, and then sow. They then germinate in about one month. In this climate if I sow in, say, October, I always get flowers the following summer, and they keep in flower practically all the year under irrigation."]

Primula sinensis stellata.—A remarkable instance of foliose development of the calyx in *Primula sinensis stellata* was shown by Mr. Odell, in which the calyx segments were many times as long as the petals, and were of distinct leafy form.

Vegetable Marrow fasciated.—The well-marked example of this common malformation was sent by Mr. W. A. Voss, particularly remarkable on account of the flowers being produced in pairs along the stem, each pair consisting of either two staminate or two pistillate flowers, and the fruits also growing in pairs.

Malformation in Vitis sicyoides.—Mr. W. Patterson sent an interesting specimen of a malformed *Vitis sicyoides* from St. Vincent. The malformation is mentioned in Griesbach's *Flora of the British West India Islands* (p. 102), where it is said to be common, but this is the first specimen met with by Mr. Patterson. It was growing "just where the conditions prevailing might be expected to exert influence to encourage an inflorescence to grow into such a form—namely, moisture and very little light." The specimen sent, which was over 15 inches in length and consisted of long, slender branches bearing numerous short, whorled branchlets, was "part of one axillary growth found on the ground under dense shade." Mr. Patterson drew attention to dark streaks of fungus spores on the ultimate branches, and suggested that the malformation might be of pathological origin. The fungus *Schroeteria cissi* present is a member of the Ustilagineae and is no doubt the cause of the malformation. The form to which it gives rise has been described as a type of a new genus, *Spondylantha aphylla*, by Presl., *Rel. Haenk.*, ii., 35, t. 53 (1834).

Cattleya × sororia, Rchb. f.—Mr. A. Rolfe exhibited a flower which had been raised in the collection of W. Evans, Esq., of Leicester, from *C. Harrisoniana* crossed with the pollen of *C. bicolor*, and remarked that it was identical with the natural hybrid, *C. × sororia*, Rchb. f., and thus confirmed its supposed parentage, which was originally in doubt. He also exhibited for comparison paintings from the *Dictionnaire des Orchidées* of the two parents, remarking incidentally that the one figured as *C. Harrisoniana* was wrongly labelled *C.*

Loddigesii, and that, in fact, the names of the two species had been transposed, as was sometimes the case in gardens.

Laeliocattleya \times *amanda*, *Rchb. f.* and *L.-c.* \times *Verelii*, *Rolfe*.—Mr. Rolfe also exhibited flowers of these two natural hybrids, remarking that they were originally confused under the former name. The first, however, was from *Laelia Boothiana* and *Cattleya intermedia*, the latter from *L. Boothiana* and *C. Forbesii*, as was evident from the strong red veining on the disc of the lip. All three species were known to grow together in the neighbourhood of Rio de Janeiro. The two hybrids were in flower at Kew, that of *L.-c.* \times *amanda* being from a batch raised by himself by crossing *L. Boothiana* and *C. intermedia*, with a view to proving the parentage. Paintings of some of the plants in question were also shown.

Pollination in Orchards.—Mr. C. H. Hooper gave an outline of his observations on pollination in orchards (p. 531), which confirmed those of others that cross-pollination was necessary in the majority of cases in order that fruit should be produced. Mr. Worsley pointed out that a certain temperature was necessary for the shedding of pollen in many instances, and if this were not attained, infertility might result. Mr. Chittenden said that certain of the varieties Mr. Hooper had found not to set fruit without the aid of foreign pollen, he had found would do so, and suggested that in order to settle the cases in which only negative evidence was available, it was necessary to repeat the experiment several times, for there was great difficulty in eliminating many other factors which contributed to unfruitfulness.

Bitter-pit in Apples.—Among the numerous diseased plants sent for examination were several specimens of apples attacked by "bitter-pit." This disease is particularly prevalent, even among hard-fleshed apples, this season. It is characterized by numerous brown spots in the flesh at varying depths below the surface, and having, as a rule, no connexion with surface injury in any way. No fungi or bacteria have been found connected with it, and it appears to be a disease of physiological origin rather than due to any parasite. The dead, brown cells contain starch, whereas in the rest of the flesh the starch has been converted into sugar. It would therefore appear that the depth of the cells probably took place before the ripening process had proceeded so far as the conversion of starch into sugar, and may possibly be due to an accumulation of a poisonous substance in the cells through interference with the water supply.

SCIENTIFIC COMMITTEE, NOVEMBER 7, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and
eighteen members present.

Ootomeria, sp.—Dr. Rendle, F.R.S., reported that the *Ootomeria* referred to him, and shown under the name *Ootomeria Baueri*, did not

agree with the figure given by Bauer. Mr. Rolfe recognized it as *O. crassifolia*, a Brazilian species, described by Lindley, with whose type specimen in the Kew Herbarium it agrees well.

Crosses with Pisum.—Mr. A. W. Sutton, V.M.H., gave an interesting account of his experiments in crossing a Pea which he found in Palestine in 1904 with forms of the cultivated Peas. The plant found was a weak-stemmed plant, about three feet in height, and bearing very small, blunt pods. It had no purple colour in the leaf-axils, and was, therefore, supposed to be white-flowered (the plants being past flowering), and seed was collected. The seed was olive-green, heavily mottled with brown, varying to a dark brown. The seedlings raised in England had serrated leaflets, self- (not bi-) coloured magenta flowers, but no colour in the leaf-axils; the pods were small and obtuse, and curious in containing a white, woolly substance, similar to that contained in the pods of Beans. It appeared to resemble, in some measure, *Pisum quadratum*, which he had obtained from Kew; but in that the flowers are bicoloured, the leaflets entire, the seeds rounder, and not so dark in colour. In addition to these two, the only pea with bicoloured flowers and no colour in the leaf-axils known to Mr. Sutton is one obtained from Svalof, under the name 'Solvart.' With the idea of discovering whether this wild form could be the ancestor of the white-flowered culinary pea (*Pisum sativum*) or the bicoloured field pea (*P. arvense*), which some consider varieties of one species, Mr. Sutton made about forty crosses with various forms, but in only four cases was it possible to grow the hybrids to F_1 , or further, in two of which one of the parents was a variety of *P. sativum*, and in two varieties of *P. arvense*. In all the others sterility manifested itself, and the varieties were lost; but in the four crosses mentioned more or less perfect fertility seems to have been achieved. The crosses were made with the sole idea of discovering the relationship the Palestine pea had to commercial peas. Five crosses were made with round-seeded, white-flowering varieties (*P. sativum*), and sterility prevented them being grown to F_2 , similar results attending eight crosses made with wrinkled-seeded, white-flowered peas. Six crosses with round-seeded, white-flowered, umbellate peas (*P. sativum umbellatum*) gave only one that has continued fertile. Five crosses made with the degenerate types which constantly occur among cultivated varieties of *P. sativum* gave only one which has continued fertile. Sixteen crosses with bicoloured types (*P. arvense*) resulted in only two which have continued fertile. The F_1 hybrids were, as a rule, taller than the Palestine pea, and had leaflets more or less serrated; the flowers were bicoloured. In F_2 plants with white flowers and entire leaflets occurred, but none was found resembling the Palestine pea, but with white flowers. It would thus appear that the pea occurring wild in Palestine is not the plant from which the cultivated forms have been derived. Mr. Sutton exhibited seeds of the wild form and of the cultivated ones with which it was crossed. It was unanimously resolved, on the motion of Mr. Holmes, F.L.S., seconded by Mr. Bennett-Poë,

V.M.H., to recommend the award of a Certificate of Appreciation to Mr. Sutton for his work in connexion with these peas.

Interesting Orchids.—Mr. O'Brien, V.M.H., showed some interesting orchids on behalf of the Rev. Mr. Fletcher, including *Bulbophyllum Medusae*, *Catasetum Gnomus* of Reichenbach, and a species of *Epidendrum* which Mr. Rolfe later identified as *E. Harrisoniae*, Hook. (*Bot. Mag.* t. 8392), a native of Brazil, and a somewhat variable plant.

Primula farinosa.—Mr. Gordon, V.M.H., remarked that he had noticed a form of *Primula farinosa* in the Alps with a distinct white centre to the flower, and with the tips of the petals pink. He dug the plant up, but the new flowers came more and more like the type, until the last ones were entirely like it.

Malformation of Cattleya labiata.—Mr. Wilson, F.L.S., exhibited flowers of *Cattleya labiata* showing false peloria, produced on a plant which each year bears malformed flowers, though not always malformed in the same fashion as in the present case.

Ceropegias.—Mr. Ledger exhibited a flowering spray of *Ceropegia* × *Rothii* Gürke, a new hybrid raised by Dr. Paul Roth, of Bernburg, from seed obtained in 1908 by crossing *C. Sandersonii*, Hook., with pollen of *C. radicans*, Schlecht., two South African species. It is a twining succulent, with fleshy leaves, intermediate between both parents. The flowers resemble those of the seed parent in colour, but the umbrella-like apex in that species is here modified to erect, replicate lobes, cohering at the top, somewhat as in *C. hybrida*, N. E. Br. (in *Gardeners' Chronicle*, December 8, 1906, p. 383), a flower of which was also shown. Mr. Ledger stated that, in describing the last-named plant, Mr. N. E. Brown drew attention to the peculiar structure of the Asclepiads, unique among Dicotyledons in having the pollen agglutinated into a waxy mass, and so placed that pollination would seem to be only possible through insect agency, and that to effect it artificially would, if at all possible, prove a very delicate and difficult operation. Dr. Roth has, however, successfully accomplished, in this instance, the first artificial hybridization to be recorded in the genus *Ceropegia*. The plant is described in *Monatsschrift für Kakteenkunde*, for January 1911, pp. 8-9. Mr. Ledger also showed a flowering spray of *C. Rendallii*, N. E. Br., a slender-growing, tuberous-rooted species. The corolla lobes of the delicate and beautiful flowers are united into an umbrella-like canopy, of a bright-green colour, supported on five short stalks over the mouth of the tube, which is white in the upper part and grey-green in the inflated base. This species belongs to the section which includes *Sandersonii*, *Monteiroae*, and the not-yet-introduced *fimbriata*. *C. Rendallii* was first sent to Kew early in the year 1894, by the late Dr. P. Rendall, of Barberton, after whom it was named. (*Kew Bulletin*, 1894, p. 100.) Long lost to cultivation, a tuber (without name) was sent in 1908 by Mr. George Thorncroft, of Barberton, to the late Mr. W. E. Gumbleton, who presented it to Mr. Ledger, and from this all the plants at present grown are derived.

Mr. Ledger has raised a hybrid from *C. Barklyi*, Hook. f., fertilized, in 1909, by pollen of this species.

Certificate of Appreciation.—Mr. J. Gurney Fowler showed *Odontocidium* \times *Fowlerianum* raised between *Odontoglossum cirrhosum* and *Oncidium Forbesii*. The sepals and petals broadly lanceolate, primrose yellow, barred with red-brown; lip yellow, with chestnut-red spots. A Certificate of Appreciation was recommended to Mr. Fowler for achieving this new bigeneric cross.

SCIENTIFIC COMMITTEE, NOVEMBER 21, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and eleven members present.

Raspberry Beetles.—The Rev. Canon Fowler showed specimens of the raspberry beetle, *Byturus tomentosus*, which feeds in the flowers of Raspberry, Blackberry, Loganberry, and Strawberry, remarking that in all probability the pest pupates in the soil, and not so much in old stems, &c. He considered that if some measure of reaching the pest in the soil could be devised it would prove very beneficial, but after some discussion the committee thought that none of the methods at present economically available would be entirely suitable in the present instance. It was remarked that some success had been attained in dealing with this pest by shaking the canes over tarred boards and by spraying with lead arsenate during the time the plants were in bloom.

Uncommon fruits.—A. Bayldon, Esq., sent from Dawlish, Devon, a bunch of about 16 fruits (on one branch) of *Mandevilla suaveolens*, and a pair which measured 20 inches in length; a bunch of seed pods of *Wistaria japonica* from a standard on its own roots which bore several dozen fruits; *W. multijuga* was also fruiting in the same garden, and had produced racemes 30 inches to 36 inches in length; a spray of many fruits of *Cornus capitata* (*Benthamia fragifera*) from a very old tree 26 feet in height. The seeds of *Cornus capitata* are picked from the fallen fruit by the blackbirds and dropped about the grounds. Mr. R. Shafto Adair, of Clauville, Minehead, Somerset, sent two excellent fruits of the common pomegranate, perfectly ripe, and open to show the seeds, picked from a plant growing on a south wall.

Streak disease in Potato.—Mr. A. S. Horne, B.Sc., of the Wisley Laboratory, exhibited specimens in illustration of the following notes: In 1910 a sample of seed potatoes of the variety 'Duke of York' was obtained from a dealer in the North of England. When the tubers were examined about 20 per cent. of them were found to be affected with streak disease. Several diseased tubers, however, were not included in the estimate. These were rotten in the middle, and the flesh was more or less excavated, the cavity or cavities being enclosed by diseased tissue. It was supposed at the time that this condition was due to some other cause. During November 1911,

however, a complete series of stages has been obtained between streaked and rotten tubers of the same variety of potato. The following stages in the development of streak disease in the variety 'Duke of York' were sent for inspection:—

1. Potatoes marked internally with streaks as described in the *Journal of Agricultural Science*, iii, September, 1910.

2. Potatoes with internal brown rot. Upon closely inspecting the flesh the rotten area is seen to be made up of a number of concentric curved brown lines; the lines are very numerous, and almost in contact with one another. The lines show up well when a slice of the potato is soaked in potash.

3. Potatoes with cavities in the flesh which are bounded by a brown zone of diseased tissue.

4. Potatoes similarly diseased, but having external injuries.

The diseased potatoes were raised in Scotland, with the co-operation of Mr. W. G. McGowan, in connexion with potato investigations, of which an account has not yet been published. The seed potatoes of the variety 'Duke of York' were obtained from a locality in which streak disease is at present unknown, and were free from disease when planted.

SCIENTIFIC COMMITTEE, DECEMBER 5, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and nine members present.

The late Mr. James Douglas, V.M.H.—It was unanimously resolved to convey a vote of condolence to Mrs. Douglas on the death of Mr. James Douglas, who had for many years been a member of the Scientific Committee.

Double Odontoglossum crispum.—Mr. Gurney Wilson, on behalf of Mr. Jensen, showed a double flower of *Odontoglossum crispum*. The two outer whorls were normal, but the stamens had apparently developed and become petaloid. The plant showed the same peculiarity each year.

Gall on Ribes alpinum.—Dr. Rendle, F.R.S., exhibited a branch of *Ribes alpinum* from a place near Grantham, having large numbers of black galls upon it about $\frac{3}{4}$ inch to 1 inch long, so numerous that the whole bore a superficial resemblance to a small branch of larch bearing numerous small cones. The cause of the production of these galls was unknown.

Uncommon fruit.—Mr. Gordon, V.M.H., exhibited a ripe fruit of *Holboellia latifolia* (*Stauntonia latifolia*) from a wall at Somerleyton Hall, where it had not been known to fruit before.

Aberrations of Saxifraga ligulata.—Mr. Worsdell, F.L.S., showed specimens of leaves from a plant of *Saxifraga ligulata* at Kew which, season after season in the autumn, produces leaves of ascidia form and developed in different degrees. Many of the leaves showed creasing as well.

Violets with branched peduncles.—Mr. Worsdell also exhibited violets with branched peduncles from Mr. Williams. The specimens were sometimes branched low down and sometimes so near the flower that two double flowers were developed almost touching one another.

SCIENTIFIC COMMITTEE, DECEMBER 29, 1911.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and two members present.

The late Sir Joseph Hooker.—It was unanimously resolved that a vote of condolence should be sent to Lady Hooker on the death of Sir Joseph Hooker, G.C.S.I., C.B., O.M., F.R.S., V.M.H., Chairman of the Committee from its inception in 1868 to the present time.

Malformed Cyrtopodium.—Mr. G. W. Miller, of Wisbech, sent a malformed *Cyrtopodium*, which Mr. W. C. Worsdell reported upon as follows: "This is a multifold flower, beginning to divide into two flowers. There are two posterior sepals, three ordinary petals, two staminodes, and three stamens of the *inner* whorl, but the third one between the two staminodes merely represents one of the lateral inner stamens of the *second* flower, which the whole is striving to form. It is not, in my opinion, a case of reversion to the original number of stamens, as it is a *fasciated* and not a *polymerous* flower in this case. There is also an extra carpel."

Phyllocactus and Cereus.—Mr. Worsley showed a stem of *Phyllocactus* measuring about 6 feet 6 inches in length, and remarked that many attempts had been made to separate the plants known in gardens under the name *Phyllocactus* from the genus *Cereus*. Mr. Worsley asserted that there were no botanical distinctions such as would justify the retention of both generic names. It was, however, said that the name *Phyllocactus* was useful as a garden name because of the distinction between the one or two feet high kinds that are known as *Phyllocacti*, and the generally much longer growths of the genus *Cereus*. The specimen Mr. Worsley showed was evidence of the unreliability of this character as a mark of distinction between the genera.

FRUIT AND VEGETABLE COMMITTEE.

SEPTEMBER 12, 1911.

Mr. OWEN THOMAS, V.M.H., in the Chair, and eleven members present.

Awards Recommended:—

Silver-gilt Knightian Medal.

To Mr. Stanard, Hertford, for Onions.

Silver Knightian Medal.

To Leopold de Rothschild, Esq. (gr. Mr. Reynolds), Acton, for Nectarines from pot-grown trees.

To H. B. Brandt, Esq. (gr. Mr. T. Heron), Nutfield, for Grapes.

To Messrs. Paul, Waltham Cross, for fruit trees in pots.

Silver Banksian Medal.

To Messrs. Low, Bush Hill Park, for Fruit.

To Purfleet Council School, Essex, for Apples and Pears.

Award of Merit.

To Apple 'Charles Eyre' (votes, unanimous), from Mr. W. Pope, Welford Park, Newbury. A very large rather conical apple of a pale-green colour, with a deep closed eye and a deeply inserted thin stalk. It was raised by Mr. Charles Ross. (Fig. 141.)

Cultural Commendation.

To Mr. G. Woodward, Barham, Maidstone, for Pear 'Dr. Jules Guyot.'

Other Exhibits.

Mr. N. G. Jolliffe, Wotton, Isle of Wight: seedling Apple.

Dr. Lucas, Dulwich: Oranges from Australia.

Mr. G. W. Miller, Wisbech: Apple 'Red Victoria.'

Messrs. Rutter, Wisbech: Apple 'Peach Bloom.'

A. Turner, Esq., Chelmsford: seedling Apple.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 19, 1911.

SUB-COMMITTEE AT WISLEY.

Mr. A. DEAN, V.M.H., in the Chair, and five other members present.

The following were selected for exhibition before the full Committee:—

Carrots:—7.* 'Best of All.'

24. 'Early Gem.'

* See footnote, p. 399.

- 27. 'Early Nantes' (stump-rooted).
- 44. 'Little Gem.'
- 54. 'Model.'
- 66. 'Scarlet Model' (stump-rooted).
- 77. 'Golden Tankard.'

Potatos:—34. 'Balgownie Seedling.'

- 40. 'Dobbie's Prolific.'
- 45. 'Erin's Queen.'
- 47. 'Great Scot.'
- 64. 'Toogood's Tremendous.'
- 74. 'The Factor.'
- 75. 'Up-to-Date.'

Autumn-fruiting Raspberries 'Belle de Fontenoy,' from W. J. Burn, Cromer.

Raspberry 'Everbearing Feldbrunnen,' from Mr. W. J. Burn, Cromer.

Raspberry 'Herbert,' from Mr. R. B. Whyte, Ottawa, Canada.

Raspberry 'November Abundance,' from Mr. W. J. Burn, Cromer.

Raspberry 'Perpétuel de Serrières,' from Mr. W. J. Burn, Cromer.

Raspberry 'Rouge Merveille,' from Messrs. Bunyard, Maidstone.

Raspberry 'Surpasse Fastolf,' from Mr. Pfitzer, Stuttgart.

Raspberry 'Surpasse Merveille Rouge,' from Mr. W. J. Burn, Cromer.

Raspberry 'Surprise d'Automne,' from Mr. W. J. Burn, Cromer.

Savoys:—2. 'Cannon Ball.'

- 32. 'Ironhead.'
- 34. 'Large Aubervilliers.'
- 36. 'Late Drumhead.'
- 42. 'Maincrop.'
- 45. 'New Year.'
- 52. 'Reliance.'

The Committee examined the varieties of Grapes 'Directeur Tisserand' and 'Alnwick Seedling,' and though they considered them very similar in appearance, they were able to distinguish between them by the following:—

- (a) 'Directeur Tisserand' has slightly the better flavour.
- (b) It is firmer and darker in the flesh.
- (c) There is a slight distinction in the foliage.
- (d) 'Directeur Tisserand' is said to set freely with its own pollen, while 'Alnwick Seedling' does not, but appears to require foreign pollen to ensure a good set.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 26, 1911.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and twenty-four members present.

Awards Recommended :—

Gold Medal.

To Lieut.-Colonel A. C. Borton (gr. Mr. Whittle), Hunton, Maidstone, for a collection of fruit.

To E. Mocatta, Esq., Addlestone, for Gourds.

To Messrs. Sutton, Reading, for vegetables.

Silver-gilt Knightian Medal.

To Messrs. Bunyard, Maidstone, for orchard-house fruit.

To J. A. Nix, Esq. (gr. Mr. E. Neal), Crawley, for fruit.

Silver-gilt Banksian Medal.

To Leopold de Rothschild, Esq. (gr. Mr. G. Reynolds), Acton, for fruit.

To Messrs. Veitch, Chelsea, for vegetables.

Silver Knightian Medal.

To Messrs. Barr, Covent Garden, for vegetables.

Silver Banksian Medal.

To Mr. A. Mitchelson, Guildford, for Melons.

Award of Merit.

To Apple 'Ellison's Orange' (votes, unanimous), from Mr. W. Crump, Malvern, and Mr. W. Markham, Barnet. This variety is said to be the result of a cross between 'Cox's Orange Pippin' and 'Calville Blanche.' It is of medium size, yellowish in colour, of excellent flavour, and ripens in October. It is reported to be a good cropper.

To Carrot 'Early Gem,' from Messrs. Sutton, Reading.

To Potato 'Balgownie Seedling,' from Mr. J. Yule, Aberdeen.

To Potato 'Erin's Queen,' from Mr. W. E. Sands, Hillsborough, Ireland.

To Potato 'Great Scot,' from Messrs. R. Veitch, Exeter.

To Potato 'Scottish Prolific,' from Messrs. Dobbie, Edinburgh.

To Potato 'Toogood's Tremendous,' from Messrs. Toogood, Southampton.

To Raspberry 'Everbearing Feldbrunnen,' from Mr. W. J. Burn, Cromer.

To Raspberry 'Perpétuel de Serrières,' from Mr. W. J. Burn.

To Raspberry 'Rouge Merveille,' from Messrs. Bunyard, Maidstone.

To Raspberry 'Surpasse Fastolf,' from Mr. W. Pfitzer, Stuttgart.

To Raspberry 'Surpasse Merveille Rouge,' from Mr. W. J. Burn.
To Raspberry 'Surprise d'Automne,' from Mr. W. J. Burn.

All the above, with the exception of the Apple, were grown on trial at Wisley. For descriptions see Report of Wisley Trials (p. 561).

Other Exhibits.

Mr. H. Budd, Portsmouth: Apple 'Golden Dawn.'
F. W. Dunstan, Esq., Donhead, Salisbury: Apples.
Hon. Vicary Gibbs, Elstree: *Rubus Kuntzeanus*.
Mr. C. Goble, Westbourne: Onions.
Mr. S. A. Kitcat, Esher: Apples.
Messrs. Laxton, Bedford: Apples, &c.
Mr. A. Turner, Chelmsford: Apple 'Agnes Pippin.'

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 10, 1911.

BRITISH FRUIT SHOW.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and twenty-eight members present.

No awards were recommended on this occasion.

Exhibits.

Mr. S. Jackson, Shrewsbury: Apple seedling.
King's Acre Nurseries, Hereford: Apple 'British Queen.'
Messrs. Little and Ballantyne, Carlisle: seedling Apples.
G. Littlewood, Esq., Brightlingsea: seedling Apple.
F. Lloyd, Esq., Croydon: Pear 'Double de Guerre.'
W. B. McDonall, Esq., Shepherd's Bush: Grapes.
Mr. Miller, Marlow: Apples.
Mr. R. S. Morris, Worcester: seedling Apples.
Mr. J. Sloane, Melton Mowbray: Apple 'James Sloane.'
Lady Thornycroft, Bembridge: seedling Apples.
Mrs. Wedgwood, London, W.: Grapes ripened in the open.
Mr. R. Whiteny, Creden Hill, nr. Hereford: Apple 'Rev. W. Wilks.'
W. Wickham, Esq., Rochester: seedling Apples.
Hon. Frances Wolseley, Glynde: Apple 'Bramley's Seedling' and Apple 'Peasgood's Nonesuch.'
Messrs. Wright, Leicester: seedling Apples.

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 24, 1911.

Mr. A. H. PEARSON, J.P., V.M.H., in the Chair, and fourteen members present.

Awards Recommended:—

Silver Knightian Medal.

To Mr. W. E. Sands, Hillsborough, Ireland, for Potatoes.

Silver Banksian Medal.

To Messrs. Ambrose, Upper Halliford, for Apples and Pears.

Bronze Knightian.

To Mr. W. B. McDouall, Shepherd's Bush, for Grapes grown in the open.

Award of Merit.

To Plum 'Vert's Violet' (votes, unanimous), from Mr. J. Vert, Audley End Gardens, Saffron Walden. This is a sport from the well-known 'Coe's Golden Drop,' differing only in colour, which is a delicate buff shaded with violet, and with a distinct violet-coloured line all down the suture. (Fig. 142.)

Other Exhibits.

R. Armstrong, Esq., Drunyarkin, Dartrey: seedling Apple.

Mr. J. Arthars, Studley R.S.O.: Apple 'George V.'

W. B. M. Bird, Esq. (gr. Mr. Gooding), Chichester: Apples.

Mr. F. H. Chapman, Rye: Tomato 'Autumn Dainty.'

Messrs. Dobbie, Edinburgh: Victoria Kale.

Mrs. Haldane Stewart (gr. Mr. T. Waters), Limpsfield: Apples.

Mr. G. Littlewood, Brightlingsea: Apples.

R.H.S. Gardens, Wisley: Carrots.

Messrs. Veitch, Chelsea: Walnuts.

Mr. H. Whiteley, Torquay: Apple 'Endsleigh Beauty.'

Mr. C. Wright, Aylesbury: Apples.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 7, 1911.

Mr. G. BUNYARD, V.M.H., in the Chair, and ten members present.

Awards Recommended:—

Award of Merit.

To Apple 'Sir John Thornycroft,' from Lady Thornycroft, Steyne, Bembridge, Isle of Wight. The award is subject to more precise information being supplied at the next meeting of the Committee.

Other Exhibits.

Mr. E. Burden, Patney, Wilts: seedling Apples.

Messrs. Hartland, Cork: Apples.

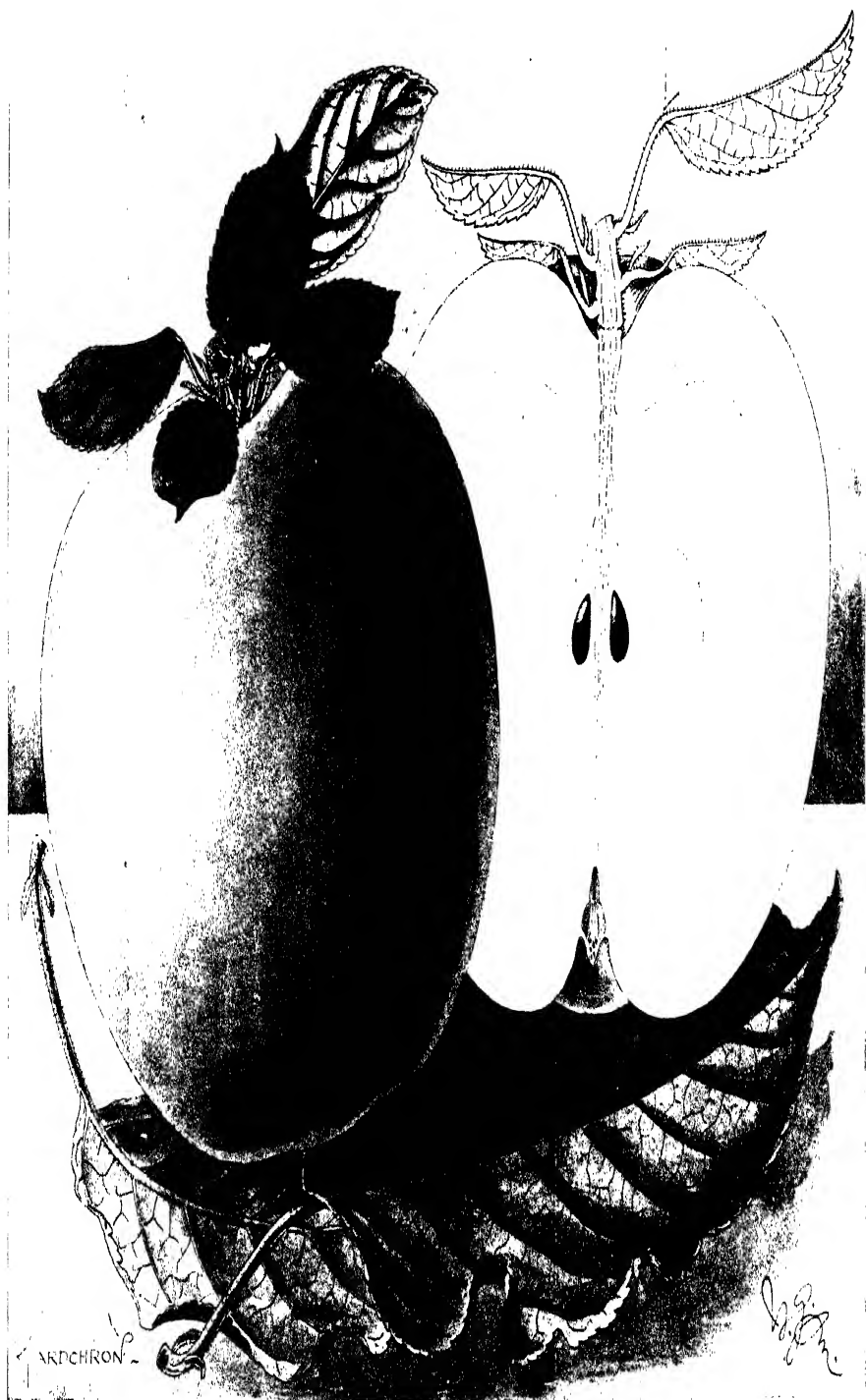


FIG. 141.—APPLE 'CHARLES EYRE.' (*Gardeners' Chronicle*.) (p. cccxii.)

(To face p. cccxvi.)



FIG. 142. PLUM 'VERT'S VIOLET.' (*Gardeners' Magazine.*) (p. ccxxvi.)

Mrs. Kneller, Whitchurch, Hants: Apples.
Messrs. Stuart Low, Bush Hill Park: Fruit.
Mr. H. H. Thorne, Teddington: Pears.
Rev. W. Wilks, M.A., Shirley: Apples.
Miss M. H. Williams, Wrentham: Apples.
W. A. Voss, Esq., Rayleigh: Fruit.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 21, 1911.

Mr. JOSEPH CHEAL in the Chair, and fifteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree, Herts., for Apples.

Silver-gilt Banksian Medal.

To Mrs. Banks, 102 Park Street, W., for preserved Fruits and Vegetables.

Silver Knightian Medal.

To G. W. Tyser, Esq., Mortimer, Berks, for Apples.

Silver Banksian Medal.

To Lord Hillingdon (gr. Mr. A. R. Allan), Uxbridge, for Pears.

To Mrs. Miller, Marlow, for "Moyleen" confections.

To Mr. W. Pope, Newbury, for Apples (Ross's seedlings).

Award of Merit.

To Apple 'Sir John Thornycroft' (votes, unanimous), from Lady Thornycroft, Steyne, Bembridge, Isle of Wight. This fruit has a moderately deep, closed eye, slightly corrugated. The stalk is half-inch long and deeply inserted. The colour is yellow, flushed and striped with red. The shape is flat and round, and the crisp, juicy flesh has a strong "Cox's" flavour. It is in season from November to January. (Fig. 143.)

Other Exhibits.

Mr. W. Hobby, Yeovil: Apple 'Hobby's Seedling.'

Walliss Marshall, Esq., Alford: Peas for identification.

Mr. Minchin, Henfield: Apple 'Knight's Seedling.'

Mr. S. Rutherford, Nova Scotia: Apples.

Mr. T. Stirling, Bury St. Edmund's: Pomegranates.

Messrs. Veitch, Chelsea: Pear 'Dana's Hovey,' A.M. November 24, 1908.

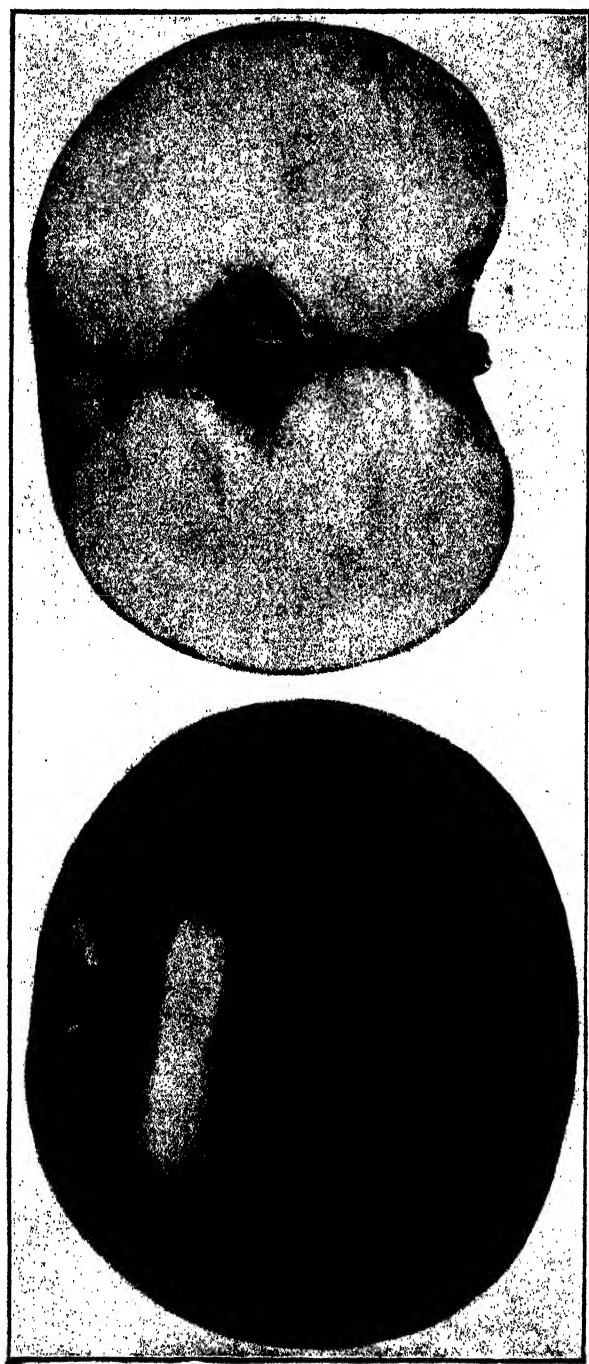


FIG. 143.—APPLE 'SIR JOHN THORNYCROFT' (*Journal of Horticulture*.)

FRUIT AND VEGETABLE COMMITTEE, DECEMBER 5, 1911.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and fourteen members present.

Awards Recommended :--

Silver-gilt Banksian Medal.

To Messrs. Cannell, Swanley, for Fruit.

To Earl Stanhope (gr. Mr. J. C. Sutton), Sevenoaks, for Apples.

Other Exhibits.

Mr. C. Elwell, Sedgley : Apples.

Mr. E. R. Janes, Banbury : Apples.

Mrs. Miller, Marlow : ' Moyleen ' confections.

Miss Sewell, Kensington : Jams and marmalade.

FRUIT AND VEGETABLE COMMITTEE, DECEMBER 19, 1911.

Mr. OWEN THOMAS, V.M.H., in the Chair, and six members present.

No awards were recommended on this occasion.

Exhibits.

Mr. W. L. Hubble, Faversham : Apple ' George V. '

Mr. A. Hussey, Crowthorne : seedling Apple.

FLORAL COMMITTEE.

SEPTEMBER 12, 1911.

Chairmen { Mr. W. MARSHALL, V.M.H. (Groups).
 { Mr. H. B. MAY, V.M.H. (Committee).
Seventeen other members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Hobbies, Dereham, for Dahlias.

To Messrs. Carter Page, London Wall, for Dahlias.

Silver-gilt Banksian Medal.

To Mr. Box, Lindfield, for hardy plants.

To E. H. Brown, Esq. (gr. Mr. R. Bradford), Roehampton, for Crotons.

To Mr. West, Brentwood, for Dahlias.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for Dahlias.

To Messrs. Cutbush, Highgate, for miscellaneous plants.

To Messrs. May, Upper Edmonton, for Veronicas and Ferns.

To Mr. A. Perry, Enfield, for Nymphæas and Delphiniums.

To Mr. L. R. Russell, Richmond, for Clematis and Gesnerias.

To Mr. C. Turner, Slough, for Dahlias.

Bronze Flora Medal.

To Messrs. Cannell, Swanley, for Begonias.

To Messrs. Ware, Feltham, for Dahlias and Michaelmas Daisies.

Award of Merit.

To *Amaryllis* × *Parkeri* (votes, unanimous), from Leopold de Rothschild, Esq., C.V.O. (gr. Mr. J. Hudson, V.M.H.), Gunnersbury House, Acton. This lovely plant was sent from New Zealand in 1905. The strong flower stalk had been cut off level with the ground, and measured 2 feet 6 inches in height. It carried a magnificent head of thirty open flowers and buds. The flowers are trumpet-shaped, and measure $3\frac{1}{2}$ inches long by 3 inches across the mouth of the trumpet. They are rose coloured, with a tinge of orange at the base, and are connected to the main stem by pedicels $2\frac{1}{2}$ inches long. The pistil is very prominent and the scent exquisite.

To *Amaryllis* × *Parkeri alba* (votes, unanimous), from A. Worsley, Esq., Isleworth. This is practically identical in habit with the above, but the flowers are creamy white, with a pronounced apricot

tinge at the base of the trumpet. In this case there were twenty-eight flowers and buds with a delicious perfume.

To *Brunsdonna* × *Sanderae alba* (votes, 10 for, 4 against), from Messrs. Sander, St. Albans. This interesting plant is said to be one of a batch of hybrids raised by crossing a white *Brunsvigia* (*Josephinae*?) and *Amaryllis Belladonna*. The long trumpet-shaped flowers are white,



FIG. 144.—CARNATION 'WHITE WONDER' (*Allwood.*) (p. CCXXXII.)

with a tinge of golden yellow at the base, and are borne in heads of four or five after the manner of an *Amaryllis*. They are about 4 inches long, and the mouth of the trumpet measures $2\frac{1}{2}$ inches across. The pedicels are short and thick, and the scent is very pleasing. The plants were grown in a sheltered spot out of doors.

To Carnation 'White Wonder' (votes, 8 for), from Messrs. Allwood, Haywards Heath. A new perpetual flowering variety having pure white flowers of excellent form with a very noticeable and pleasing scent. It is a seedling from 'White Perfection,' and has a more bushy habit of growth than its parent. It has a perfect calyx and the petals have nicely serrated edges. (Fig. 144.)

To Dahlia 'Maurice Rivoire' (votes, unanimous), from Messrs. Hobbies, Dereham. This variety belongs to the 'Collarette' section and is about 4 inches across. The outer florets are deep velvety crimson, and the ring of small florets round the golden yellow centre is white. The flowers are on stiff stems and very showy. (Fig. 150.)

To Dahlia 'Miss Stredwick' (votes, unanimous), from Messrs. Stredwick, St. Leonards. A splendid 'cactus' variety of a rose colour. The flowers are 7 inches across, and are borne on stiff stems. The petals are slightly twisted.

To Dahlia 'Richard Box' (votes, 13 for), from Messrs. Stredwick, St. Leonards. An excellent bright sulphur yellow 'cactus' variety of large size and perfect form. The flowers are borne on strong stems, and are fully 7 inches across.

To Dahlia 'Union Jack' (votes, unanimous), from Mr. C. Turner, Slough. A single variety also known as 'Star of Denmark,' and having bright scarlet petals each with a broad white streak. The flowers are about $3\frac{1}{2}$ inches across, and the habit of the plants appears to be very free flowering.

Other Exhibits.

Messrs. Bakers, Codsall: Dahlias.

Messrs. Bunyard, Maidstone: Asters.

H. J. Elwes, Esq., V.M.H., Cheltenham: *Amaryllis Belladonna* varieties.

Misses Hopkins, Shepperton: hardy plants.

Sir Trevor Lawrence, Bart., Dorking: *Clerodendron coerulea*.

Mr. G. Reuthe, Keston: hardy plants.

Mr. H. Shoesmith, Woking: Dahlias.

Messrs. Veitch, Chelsea: *Hibiscus virginicus* and *H. palustris rosea*.

FLORAL COMMITTEE, SEPTEMBER 26, 1911.

Chairmen { Mr. W. MARSHALL, V.M.H. (Groups).
 { Mr. H. B. MAY, V.M.H. (Commit'ee).
 Twenty-six members present.

Awards Recommended :—*Gold Medal.*

To Messrs. Veitch, Chelsea, for Stove and Greenhouse plants and Orchids.

Silver-gilt Banksian Medal.

To Messrs. Cheal, Crawley, for Dahlias.

To Messrs. Cutbush, Highgate, for miscellaneous plants.

Silver Flora Medal.

To Messrs. Backhouse, York, for Colchicums.

To Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree, for Verbenas.

To Messrs. May, Upper Edmonton, for Ferns.

To Messrs. Carter Page, London Wall, for Dahlias.

Silver Banksian Medal.

To Mr. J. Box, Lindfield, for Asters.

To Messrs. Cannell, Swanley, for Dahlias.

To Messrs. Jones, Lewisham, for Asters.

To Mr. V. Seale, Sevenoaks, for Dahlias.

To Mr. J. T. West, Brentwood, for Dahlias.

Bronze Flora Medal.

To Messrs. Bakers, Codsall, for Dahlias.

To Mr. L. R. Russell, Richmond, for Clematis.

To Mr. C. Turner, Slough, for Pampas Grass.

Bronze Banksian Medal.

To Messrs. Barr, Covent Garden, for hardy plants.

To Mr. B. J. Riding, Chingford, for Collarette Dahlias.

To Messrs. Ware, Feltham, for Dahlias, &c.

To Messrs. Wells, Mersham, for Carnations, &c.

Award of Merit.

To Dahlia 'Golden Wave' (votes, unanimous), from Messrs. Stredwick, St. Leonards. An exceptionally good deep golden yellow 'cactus' variety of large size and excellent form.

To Dahlia 'Hon. Vicary Gibbs' (votes, unanimous), from Messrs. Cannell, Swanley. A rather large 'Collarette' variety measuring $4\frac{1}{2}$ inches across. The colour is deep velvety crimson, and the smaller florets surrounding the centre are pale yellow. The flowers are carried on good stiff stems.

To Dahlia 'Mahdi' (votes, 12 for, 1 against), from Messrs. Cheal, Crawley. A single variety of a rich maroon colour with golden yellow centre. The flowers are $2\frac{1}{2}$ inches across.

To Dahlia 'Prince de Venosa' (votes, 14 for, 2 against), from Messrs. Dobbie, Edinburgh. A deep rosy-crimson 'Collarette' Dahlia, with a ring of almost white florets round the centre. The flowers measure about $3\frac{1}{2}$ inches in diameter, and are borne on strong, stiff stems.

To Dahlia 'Queen of the Mauves' (votes, 11 for, 1 against), from Mr. M. V. Seale, Sevenoaks. A single Dahlia of perfect form

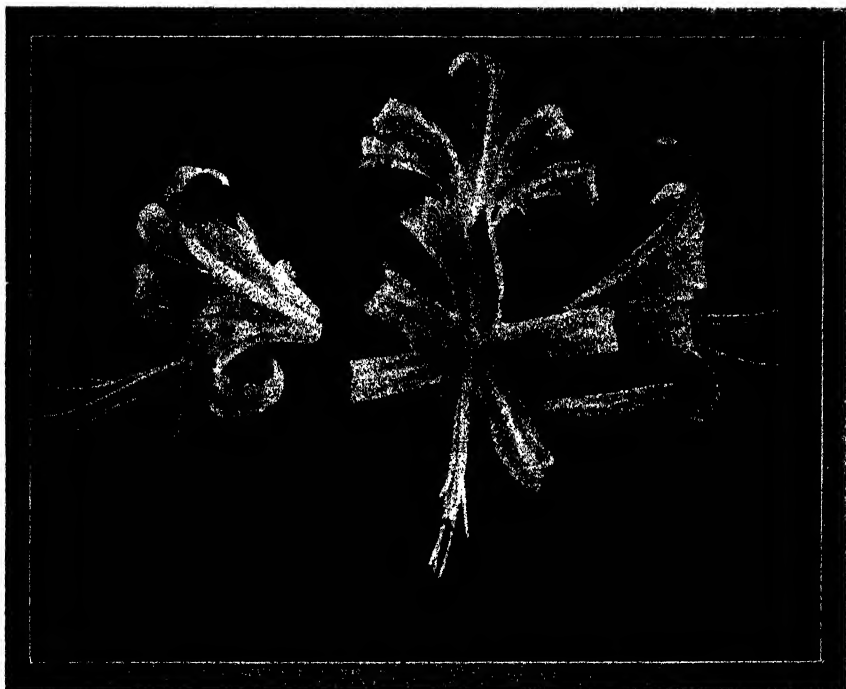


FIG. 145.—*NERINE BOWDENII PALLIDA*. (R. Veitch.)

measuring about $2\frac{3}{4}$ inches across. The colour is lilac mauve with a tinge of rose.

To Dahlia 'Stability' (votes, unanimous), from Messrs. Stredwick, St. Leonards. This most useful 'cactus' Dahlia was given an award as a garden variety on account of its very free flowering habit and its strong stems, which hold the flowers well above the foliage. The flowers are of excellent form, medium in size, and of a delicate rose colour.

To Dahlia 'Uranus' (votes, unanimous), from Messrs. Stredwick, St. Leonards. A large 'cactus' variety of good form, with the florets curving in towards the centre. The colour is white streaked with crimson, and the flower stems are strong and sturdy.

To *Nerine Bowdenii pallida* (votes, 14 for, 3 against), from Messrs.

R. Veitch, Exeter. A charming new variety imported from South Africa, and originally shown as *N. Veitchii*. The flowers are of good size, delicate pink in colour, and are borne in umbels of seven or eight. The flower stems in the specimens shown were about 20 inches long. (Fig. 145.)

To *Nymphaea Listeri* (votes, unanimous), from the Earl of Warwick (gr. Mr. Lister), Dunmow, Essex. The flowers of this lovely new

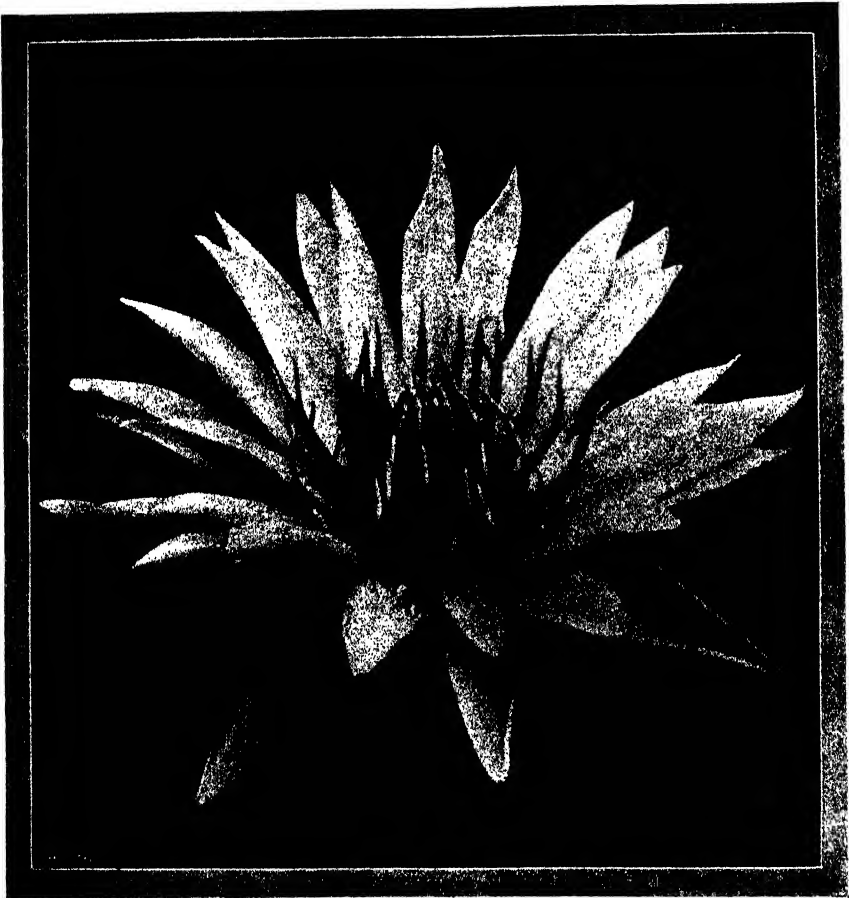


FIG. 146.—*NYMPHAEA LISTERI*. (*Gardeners' Magazine*.)

Water Lily are of a delicate pale blue colour. They measure about 7 inches in diameter and have a golden yellow centre. Their chief charm lies in their delicious perfume. (Fig. 146.)

To *Nymphaea* 'Lord Brooke' (votes, 13 for, 2 against), from the Earl of Warwick (gr. Mr. Lister), Dunmow, Essex. Another charming Water Lily obtained by crossing *Nymphaea stellata* and *N. zanzibariensis azurea*. Its flowers are of the same size and have the same delightful scent as *N. Listeri*. Their colour is pale mauve.

To *Nymphaea stellata rosea* (votes, 14 for), from Leopold de Rothschild, Esq., C.V.O. (gr. Mr. J. Hudson, V.M.H.), Gunnersbury House, Acton. A lovely crimson rose variety, having flowers measuring about 5 inches across borne on stems 2 feet in length.

To Rose 'Rayon d'Or' (votes, 24 for), from Messrs. G. Paul, Cheshunt. A most useful hybrid briar having medium-sized flowers, golden yellow in colour, tinted with pink in bud. The colour of the flowers does not fade quickly in the sun, and the constitution of the plant is good. The flowers have a delicious perfume.

Other Exhibits.

Messrs. Allwood, Haywards Heath: Carnations.

Messrs. Clark, Dover: hardy plants.

Mrs. Dennison (gr. Mr. Gentle), Little Gaddesden: Dahlias.

Guildford Hardy Plant Nurseries, Guildford: hardy plants.

Misses Hopkins, Shepperton: hardy plants.

Sir Trevor Lawrence, Bart., Dorking: *Impatiens Holstii nana Liegnitzia*.

Messrs. Low, Bush Hill Park: Carnations.

Mr. G. Reuthe, Keston: hardy plants.

Mr. H. Shoesmith, Woking: Dahlias.

FLORAL COMMITTEE, OCTOBER 10, 1911.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-four members present.

Awards Recommended:—

Award of Merit.

To Chrysanthemum 'Cranford Yellow' (votes, unanimous), from Mr. W. T. Roots, Cranford, Middlesex. An excellent early-flowering variety with large golden-yellow flowers of perfect form, and measuring about 6 inches across. The habit of the variety appeared to be very vigorous, and most suitable for market work.

To Dahlia 'Brentwood Yellow' (votes, unanimous), from Mr. J. T. West, Tower Hill, Brentwood. A good, useful Dahlia, growing from 2½ to 3 feet high, and carrying a large number of bright-yellow flowers about 6 inches across. The flower-stems are very strong, and the florets are broad. This should prove a most useful variety for garden decoration.

Other Exhibits.

Messrs. Artindale, Sheffield: *Bidens dahlioides* and *Bidens dahlioides alba*.

Messrs. Barr, Covent Garden: *Vernonia altissima*.

Mr. J. B. Biding, Chingford: Collarette Dahlias.

Messrs. R. Veitch, Exeter: *Veronica Veitchii*.

FLORAL COMMITTEE, OCTOBER 24, 1911.

Chairmen { Mr. W. MARSHALL, V.M.H. (Groups).
 { Mr. H. B. MAY, V.M.H. (Committee).
 Twenty-five members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To Messrs. May, Upper Edmonton, for Ferns and Begonias.

To Mr. L. R. Russell, Richmond, for Bamboos and berried plants.

To Messrs. Veitch, Chelsea, for Chinese plants and miscellaneous trees and shrubs.

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Highgate, for Asters, Carnations, and climbing plants.

Silver Flora Medal.

To Messrs. Bakers, Codsall, for Dahlias.

To Mr. J. Box, Lindfield, for hardy plants.

To Messrs. Cheal, Crawley, for autumn foliage and berries.

To H. J. Elwes, Esq., F.R.S., V.M.H. (gr. Mr. Walters), Collesborne, Cheltenham, for Nerines

To Mrs. Jeffrey, Lee, for paintings of flowers.

To Messrs. Ware, Feltham, for Asters, Begonias, and Dahlias.

Silver Banksian Medal.

To Messrs. Low, Bush Hill Park, for Carnations.

To Messrs. Carter Page, London Wall, for Dahlias.

To Messrs. Wells, Merstham, for Chrysanthemums and Carnations.

Bronze Flora Medal.

To Messrs. Paul, Cheshunt, for Rose hips and foliage of rare shrubs.

Award of Merit.

To *Aster* 'Amethyst' (votes, unanimous), from Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree. This Michaelmas Daisy belongs to the *novi-belgii* section, and has large, light bluish-violet flowers measuring $1\frac{1}{2}$ inch across. It is very free-flowering in habit, and when arranged in large vases lends itself admirably for indoor decoration. (Fig. 147.)

To *Aster* 'Profusion' (votes, 17 for), from Hon. Vicary Gibbs. The flowers of this *Aster*, which belongs to the *ericoides* section, are white and small. They are borne in wonderful profusion on long sprays, which furnish the plant down to the level of the ground. The plant is from 3 to 4 feet high, and is a very valuable and handsome border plant.

To *Berberis verruculosa* (votes, 12 for, 2 against), from Messrs.

J. Veitch, Chelsea. A very useful evergreen shrub from Western China. It grows about 2 feet tall, and has leathery, ovate, spiny leaves, which are shining on the upper surface and glaucous beneath. The yellow flowers are borne in pairs, and the fruits are of a violet-purple colour. (Fig. 151.)

To *Chrysanthemum* 'Bronze Goacher' (votes, 13 for), from Messrs. Wells, Merstham. This new early-flowering *Chrysanthemum* is a lovely bronze sport from 'Crimson Goacher,' which it resembles in size and habit.



FIG. 147.—*ASTER* 'AMETHYST.' (*Garden.*) (p. ccxxxvii.)

To *Chrysanthemum* 'Dorothy Dann' (votes, 8 for), from Messrs. Wells, Merstham. A very free-flowering, dull terra cotta single variety, the flowers of which measure $3\frac{1}{2}$ inches across.

To *Clerodendron Fargesii* (votes, unanimous), from the Royal Gardens, Kew. A new Chinese shrub, which is said to be quite hardy in this country. The specimen shown was in fruit. The sepals are crimson, and the berry, which is about the size of a Sweet Pea seed, is smooth, shiny, and of a Peacock blue colour. The leaves are ovate and dark green.

To *Dahlia* 'Delice' (votes, 16 for), from Messrs. Carter Page, London Wall. A lovely bright rose-pink 'Decorative' variety, having

flowers of medium size, and excellent form with broad florets. The flower stems are stiff and support the blooms well.

To *Lonicera nitida* (votes, 10 for, 2 against), from Messrs. J. Veitch, Chelsea. A neat evergreen shrub from Western China, growing from 3 to 6 feet high. The branches grow erect, and are densely covered with small, ovate, leathery leaves, which are very glossy on the upper surface. The flowers are creamy-white and very fragrant.



FIG. 148.—NERINE 'MRS. F. R. S. BALFOUR.' (*Gardeners' Magazine*.)

To *Nerine* 'Honourable Miss Gibbs' (votes, unanimous), from H. J. Elwes, Esq., F.R.S., V.M.H. (gr. Mr. Walters), Colesborne, Cheltenham. The flowers of this charming variety are large and of a deep velvety crimson colour. The edges and tips of the perianth segments have a wonderful sparkling lustre, which is seen to great advantage in a good light. The plant exhibited carried an umbel of thirteen flowers.

To *Nerine* 'Mrs. F. R. S. Balfour' (votes, unanimous), from H. J. Elwes, Esq., F.R.S., V.M.H. The perianth segments are of a

rose-pink colour shading to white at the base. and having a streak of deeper pink down the middle. The tips of the segments are very prettily crinkled. The plant shown had an umbel of nine good-sized flowers. (Fig. 148.)

To *Nerine* 'Mrs. Meade-Waldo' (votes, unanimous), from H. J. Elwes, Esq., F.R.S., V.M.H. A very fine variety, with large flowers of a bright orange-scarlet colour. The beautiful lustre referred to above was also very noticeable in this variety.

To *Nerine* 'Snowflake' (votes, unanimous), from H. J. Elwes, Esq., F.R.S., V.M.H. A lovely pure white variety of medium size. The plant shown had three well-furnished umbels, and it was thought to be one of the best white varieties yet raised.

To *Veronica* 'Silver Queen' (votes, 18 for, 4 against), from Messrs. Cutbush, Highgate. A most useful dwarf shrub, having stiff, smooth, pale yellow, ovate leaves, measuring $1\frac{1}{2}$ inch long by about $\frac{1}{2}$ inch broad, with an irregular streak of pale green in the middle. The leaves are opposite, one pair alternating with the pair next above it on the shoot. This plant was shown growing in pots, and should prove most valuable for decorative purposes.

Other Exhibits.

Messrs. Allwood, Haywards Heath: Carnations.

Messrs. Barr, Covent Garden: hardy plants.

Messrs. Dobbie, Edinburgh: *Cosmos* varieties.

W. J. Iliffe, Esq., Coventry: Chrysanthemums.

Messrs. Jones, Lewisham: Chrysanthemums.

Mr. L. L. Lawrence, Shoreham: Chrysanthemum 'Ross Lawrence.'

Mr. Martin Silsbury, Shanklin, Isle of Wight: Chrysanthemum 'Wonder.'

Messrs. Stredwick, St. Leonard's: Chrysanthemum 'Coronation.'

Messrs. R. Veitch, Exeter: Nerines.

FLORAL COMMITTEE, NOVEMBER 7, 1911.

Chairmen { Mr. W. MARSHALL, V.M.H. (Groups).
 { Mr. H. B. MAY, V.M.H. (Committee).
 Twenty-two members present.

Awards Recommended:—

Gold Medal.

To Messrs. J. Veitch, Chelsea, for Chrysanthemums and winter flowering Begonias.

Silver Flora Medal.

To H. B. Brandt, Esq., (gr. Mr. Heron), Nutfield, for Chrysanthemums.

To Messrs. S. Low, Bush Hill Park, for Carnations.

To Messrs. May, Upper Edmonton, for Begonias and Ferns.

To Messrs. Wells, Merstham, for Chrysanthemums.

Silver Banksian Medal.

To Messrs. Cutbush, Highgate, for miscellaneous flowering plants.

To Messrs. Carter Page, 52 London Wall, for Chrysanthemums.

To Messrs. Peed, West Norwood, for Chrysanthemums.

To Miss Walters Anson, Streatham, for paintings of Caladiums.

Bronze Flora Medal.

To Mr. L. R. Russell, Richmond, for berried shrubs.

Award of Merit.

To *Begonia* 'Acquisition' (votes, 16 for), from Messrs. Veitch, Chelsea. This remarkable winter-flowering *Begonia* is the result of a cross between a yellow tuberous variety and *Begonia socotrana*. The former is the seed-bearing parent and the latter the pollen bearer. The single flowers are of medium size and of a delicate rosy-pink colour. They are borne in great profusion and are well shown off by the dark green foliage.

To *Begonia* 'Exquisite' (votes, unanimous), from Messrs. Veitch, Chelsea. This variety is another result of the cross mentioned above, and has large single flowers of a very bright and pleasing rosy-pink. (Fig. 149.)

To *Begonia* 'Her Majesty' (votes, 8 for, 1 against), from Messrs. Veitch, Chelsea. Another good variety of the same type and parentage as the foregoing having large single flowers measuring from 3 to 4 inches across, of a charming orange salmon shade. The foliage is large and dark green.

To *Carnation* 'Baroness de Brien' (votes, unanimous), from Messrs. Stuart Low, Bush Hill Park. An excellent perpetual flowering variety of perfect form and good size. The colour is pale salmon pink with a few very faint markings of a deeper shade. The edges of the petals are prettily crinkled and the calyx is non-bursting. The fragrance is slight but very pleasing. The plant is said to be a compact grower. (Fig. 152.)

To *Chrysanthemum* 'Golden King' (votes, 16 for), from Messrs. Wells, Merstham. A bright golden yellow incurved variety of perfect form measuring 5 inches in diameter.

To *Chrysanthemum* 'Mrs. Andrew Walker' (votes, 11 for), from Messrs. Wells, Merstham. A deep red decorative *Chrysanthemum* with a buff reverse. It is a sport from 'Freda Bedford' and the flowers measure 6 inches across.

To *Chrysanthemum* 'Percy Arnold' (votes, 14 for), from W. G. Rigden, Esq., (gr. Mr. J. Lingwood), Englefield Green. A charming single decorative variety with several rows of florets of a rose-pink colour shading to white at the base, thus forming a zone of white

around the yellow centre. It is free flowering in habit and the individual flowers are 4 inches across. The colour lights up well under artificial light and the well-flowered sprays form excellent material for decorative purposes.

To *Chrysanthemum* 'Snowflake' (votes, unanimous), from Mr. P. Ladds, Swanley Junction. A large white single *Chrysanthemum* with a faint tinge of lilac at the base of the florets. The centre is con-

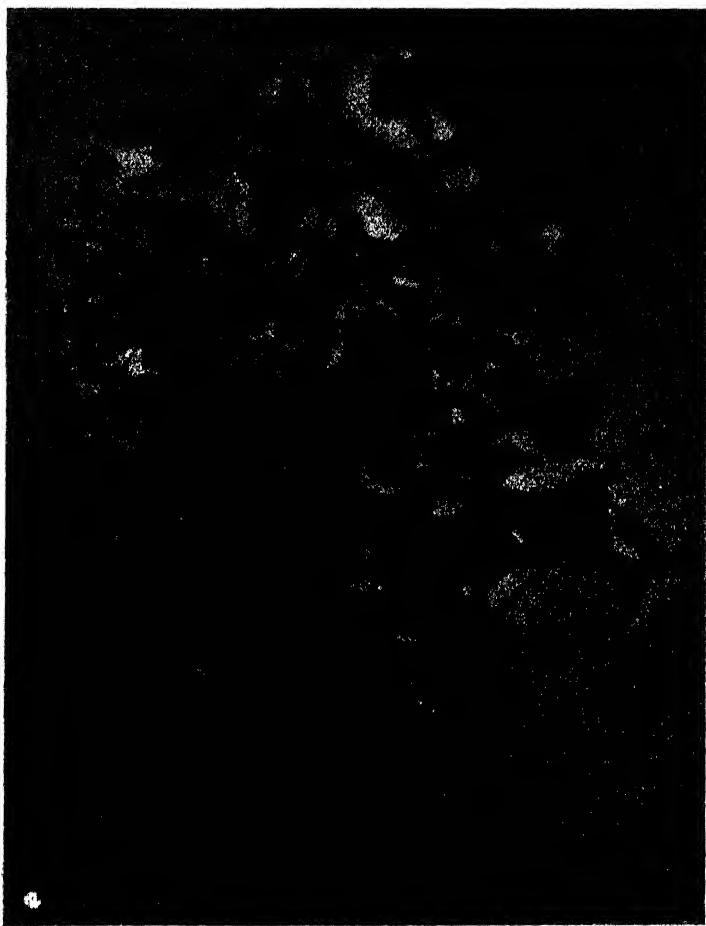


FIG. 149.—*BEGONIA* 'EXQUISITE.' (*Garden.*) (p. ccxli.)

spicuous and mostly green. The florets are stiff and the flowers measure 5 inches across. A most valuable variety for cutting.

To *Chrysanthemum* 'Yellow Cap' (votes, unanimous), from Messrs. Veitch, Chelsea, and Messrs. Wells, Merstham. A most useful golden yellow decorative *Chrysanthemum*. It is a sport from 'Caprice du Printemps' and has flowers about 3 inches across borne in great profusion. The plants exhibited were very sturdy in habit and needed no stakes to support them.



FIG. 150.—COLLARETTE DAHLIA 'MAURICE RIVOIRE.' (*Hobbies.*) (p. ccxxxii.)

(To face p. cxalii.)



FIG. 151.—*BERBERIS VERRUCULOSA*. (*Veitch.*) (p. ccxxxvii.)



FIG. 152.—CARNATION 'BARONESS DE BRIENEN.' (*Gardeners' Magazine.*)
(p. ccxli.)



FIG. 153.—ZEPHYRANTHES AUREA. (*Gardeners' Magazine.*) (p. ccxlvii.)

Other Exhibits.

W. B. M. Bird, Esq. (gr. Mr. Gooding), Chichester: Chrysanthemums.

Mr. F. Brazier, Caterham: Chrysanthemums.

Captain Clarke, D.S.O. (gr. Mr. Webb), Romsey: Chrysanthemums.

Messrs. Cragg, Harrison and Cragg, Heston: Chrysanthemums.

Mr. W. Dickman, Luton: Chrysanthemums.

G. Ferguson, Esq (gr. Mr. Smith), The Hollies, Weybridge: Chrysanthemums.

Mr. W. H. Foote, Guernsey: Nerine 'Queen of the Isles.'

Countess Fortescue (gr. Mr. Bristow), South Molton: Chrysanthemum 'Zillah.'

F. Galsworthy, Esq., Chertsey: paintings.

W. Graham Vivian, Esq., Blackpyll: *Eriobotrya japonica*.

Misses Hopkins, Shepperton: hardy plants.

Mr. C. Jordan, Hayes: Chrysanthemum 'Princess Mary.'

A. Kingsmill, Esq., Harrow Weald: Pernettyas.

Mr. F. Lilley, Guernsey: Nerines.

Mr. E. G. Longhurst, Totteridge: Chrysanthemums.

Mr. A. Mackellar, V.M.H., Windsor: Chrysanthemum 'Mrs. A. Mackellar.'

Mrs. G. N. Martin (gr. Mr. Simpkins), St. Albans: Chrysanthemums.

L. Messel, Esq. (gr. Mr. Comber), Handcross: *Cornus capitata* fruits.

Messrs. Peed, West Norwood: Chrysanthemums.

Messrs. Price and Fyfe, Lee: Chrysanthemums.

Mr. G. Reuthe, Keston: Nerines.

Mr. V. Slade, Taunton: Pelargoniums.

FLORAL COMMITTEE, NOVEMBER 21, 1911.

Chairmen { Mr. W. MARSHALL, V.M.H. (Groups).
 { Mr. H. B. MAY, V.M.H. (Committee).

Twenty-six members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To Messrs. Jones, Lewisham, for Chrysanthemums.

To Messrs. May, Upper Edmonton, for Davallias.

To Messrs. Wells, Merstham, for Chrysanthemums.

Silver-gilt Banksian Medal.

To Lord Hillingdon (gr. Mr. A. R. Allan), Uxbridge, for Begonias.

Silver Flora Medal.

To Messrs. Peed, Norwood, for Chrysanthemums.

To Messrs. Veitch, Chelsea, for Chrysanthemums and Begonias.

Silver Banksian Medal.

To Mr. J. Box, Lindfield, for Chrysanthemums.

To Mr. H. Burnett, Guernsey, for Carnations.

To Messrs. S. Low, Bush Hill Park, for Carnations.

To Mr. P. Ladds, Swanley Junction, for Chrysanthemums.

Bronze Floral Medal.

To Messrs. Cannell, Swanley, for Chrysanthemums and Pelargoniums.

To Mr. L. R. Russell, Richmond, for Gesnerias, Begonias and Aucubas.

Award of Merit.

To *Begonia* 'Fascination' (votes, unanimous), from Messrs. J. Veitch, Chelsea. A charming, tuberous-rooted winter-flowering variety with medium-sized flowers of a lovely orange-salmon shade which is seen to great advantage under artificial light. It is very free-flowering in habit and the foliage is dark green. It is the result of a cross between a copper tuberous variety and *B. socotrana*. The former is the seed-bearing parent and the latter the pollen parent.

To *Caesalpinia pulcherrima* (votes, unanimous), from G. Evans, Esq., Baldock, Herts. This is an old but little known stove shrub which grows abundantly in the West Indies. The orange-yellow flowers are borne on long pedicels in terminal, pyramidal racemes. The five petals are imbricated and there are ten stamens. The leaves are bipinnate and the numerous leaflets are small. The excellent sprays exhibited bore a few pea-like fruits.

To Chrysanthemum 'Godfrey's Perfection' (votes, 16 for, 1 against), from Mr. W. J. Godfrey, Exmouth. This very valuable decorative variety belongs to the 'Anemone-flowered' section and is pure white in colour. The flowers are about 3 inches across and have a conspicuous centre resembling a Pyrethrum surrounded by a double row of florets. It is very free-flowering in habit and is said to last well when cut.

To Chrysanthemum 'Josephine' (votes, 17 for, 1 against), from Messrs. Wells, Merstham. An excellent yellow single variety having several rows of florets surrounding a prominent centre. The flowers measure about 5 inches in diameter and are borne in useful sprays on stiff stems.

To Chrysanthemum 'Marjorie Lloyd' (votes, 10 for, 3 against), from Messrs. Wells, Merstham. Another good single of a deep bronzy apricot colour. The florets recurve considerably with age and add beauty to the flowers, which are of good size.

To Chrysanthemum 'Miss Margaret Gray' (votes, 10 for, 2

against), from Mr. P. Ladds, Swanley Junction. A large single variety having several rows of bronze ray-florets.

To Chrysanthemum 'Miss Phyllis Bryant' (votes, 12 for, 3 against), from Mr. P. Ladds, Swanley Junction. A large clear yellow single variety of free-flowering habit and having good stiff stems.

To Chrysanthemum 'Mrs. Walter Hemus' (votes, 9 for, 3 against), from Mr. T. Page, Avenue Nurseries, Hampton. An excellent single variety of a deep dull red colour. The centre is yellow and the flowers measure about 4 inches across.

To Chrysanthemum 'Norbury Yellow' (votes, unanimous), from Mr. G. Kent, Norbury Park Gardens, Dorking. A very free-flowering variety having small, full, deep golden yellow flowers supported on stiff-stemmed sprays. The specimens of this variety exhibited showed how valuable it is for decorative work when cut.

To Chrysanthemum 'Primrose Girl' (votes, 10 for, 4 against), from Messrs. J. Veitch, Chelsea. A pale primrose yellow single variety, the flowers of which measure about 3 inches across. It is remarkably free in flowering and bushy in habit.

To Chrysanthemum 'Thomas Page' (votes, 11 for, 4 against), from Mr. T. Page, Avenue Nurseries, Hampton. A large rosy-pink decorative variety. It has a good stiff stem and flowers freely.

Other Exhibits.

Messrs. Allwood, Haywards Heath: Carnations.

R. Barclay, Esq., Dorking: Chrysanthemums.

Mr. F. Brazier, Caterham: Chrysanthemum 'Caterham Yellow.

Messrs. Cutbush, Highgate: miscellaneous flowering plants.

Mr. H. Edwards, Chichester: Chrysanthemums.

Mr. A. Elisha, Old Windsor: Begonia 'Pride of Pelling.'

Mr. D. Fairweather, Canterbury: Chrysanthemums.

Hon. Vicary Gibbs, Elstree: Chrysanthemums.

Mrs. Gregory, Sevenoaks: Chrysanthemums.

L. F. Harrison, Esq., East Grinstead: Chrysanthemums.

D. Hill, Esq., Watford: Chrysanthemum 'White Vallis.'

Misses Hopkins, Shepperton: hardy plants.

Mr. G. Mileham, Leatherhead: Chrysanthemums.

Mill Hill Vineyards, Ltd., Finchley: Chrysanthemums.

Mr. W. H. Page, Hampton: Chrysanthemums and Pelargoniums.

Mr. G. Reuthe, Keston: Nerines, &c.

Mr. J. Richardson, Chislehurst: Chrysanthemums.

Mr. G. Scourfield, Neath: Chrysanthemum 'Mrs. G. Scourfield.'

Mr. G. H. Semark, Gillingham: Chrysanthemums.

Mr. M. Silsbury, Shanklin: Chrysanthemum 'F. T. Mew.'

Mr. V. Slade, Taunton: Pelargoniums.

Mr. A. Smith, Roehampton Lane, S.W.: Chrysanthemums.

Messrs. Sutton, Reading: Chrysanthemums.

Mr. G. J. Tubbs, New Eltham: Chrysanthemum 'Golden Spray.'

Mr. E. C. Tuff, Goudhurst: Chrysanthemums.

Messrs. Whitelegg and Page, Chislehurst: Chrysanthemums.

Major G. F. Whitmore, Methwold: Tobacco grown in Norfolk.

Messrs. Williams, Cardiff: Chrysanthemums.

FLORAL COMMITTEE, DECEMBER 5, 1911.

Chairmen { Mr. H. B. MAY, V.M.H. (Committee).
 { Mr. G. PAUL, J.P., V.M.H. (Groups).

Twenty-four members present.

It was unanimously resolved to send a vote of condolence to the widow and family of the late Mr. James Douglas, for many years a member of this Committee.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Outbush, Highgate, for Carnations and other flowering plants.

To Messrs May, Upper Edmonton, for Ferns.

To Messrs. Veitch, Chelsea, for greenhouse plants.

Silver Flora Medal.

To Mr. J. Bruckhaus, Twickenham, for Begonias.

To Mr. H. Burnett, Guernsey, for Carnations.

To Mr. L. R. Russell, Richmond, for hardy shrubs.

To Rev. H. Buckston (gr. Mr. A. Sharnbrook), Etwell, for Cyclamen.

To Messrs. Wells, Merstham, for Chrysanthemums.

Silver Banksian Medal.

To Messrs. Cannell, Swanley, for Pelargoniums and Chrysanthemums.

To J. Gurney Fowler, Esq., J.P. (gr. Mr. J. Davis), South Woodford, for Begonias.

To W. D. James, Esq. (gr. Mr. W. H. Smith), Chichester, for Poinsettias.

To Mr. P. Ladds, Swanley Junction, for Chrysanthemums.

To Mr. G. Lange, Hampton, for Begonias.

Bronze Banksian Medal.

To Mr. W. H. Page, Hampton, for Pelargoniums.

To Messrs. Whitelegg and Page, Chislehurst, for Chrysanthemums.

First Class Certificate.

To *Zephyranthes aurea* (votes, unanimous), from Sir Trevor Lawrence, Bart., V.M.H., Dorking (gr. Mr. Bain). This plant received

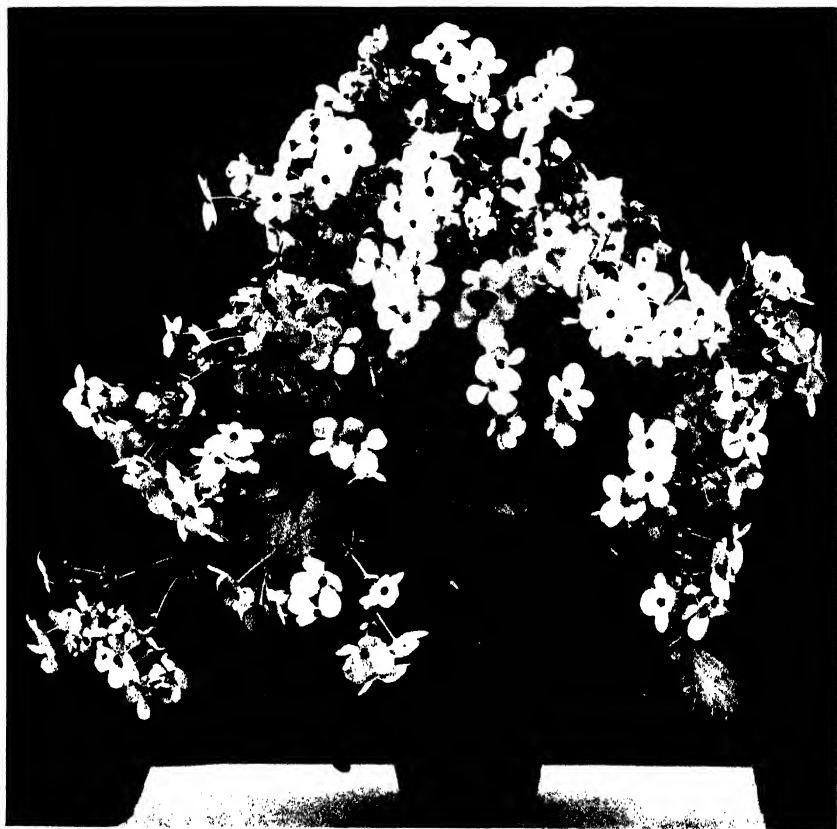


FIG. 154. BEGONIA 'GLORIE DE CINCINNATI.' (*Lange.*) (p. cexlvii.)

(To face p. cexlvi.)



C.P. 1939

FIG. 155.—CATTLEY × 'FREYA' VAR. 'MRS. FREDERICK SASSOON.' (p. ccl.)



FIG. 164.- ODONTOGLOSSUM × 'CHIONE.' (p. celvi.)

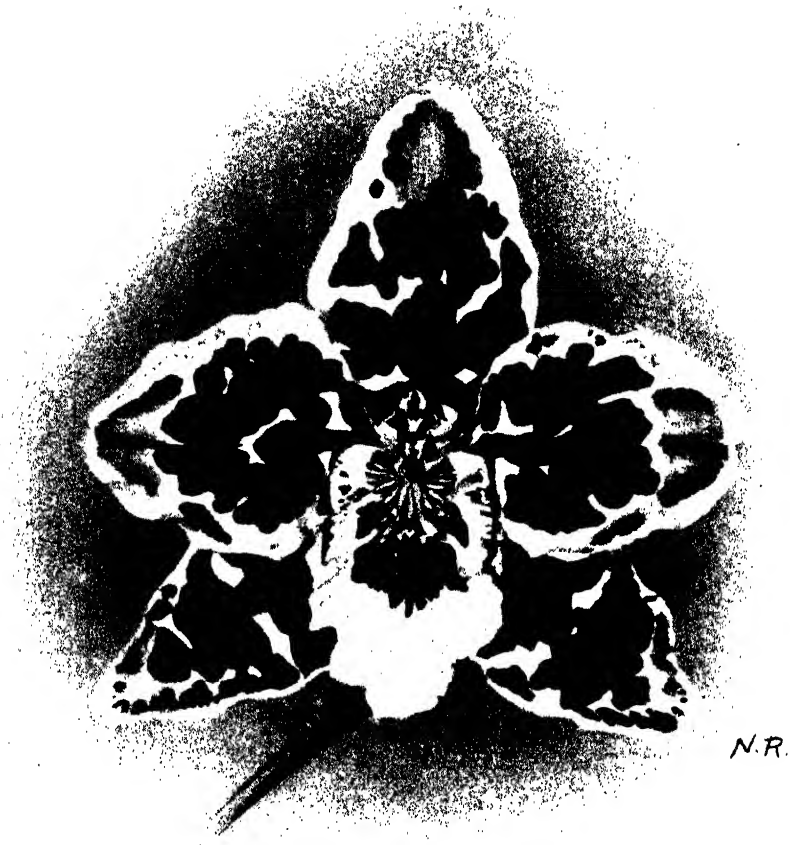


FIG. 165.—ODONTOGLOSSUM × 'THAIS.' (p. cclvi.)

an Award of Merit on June 9, 1908. For description see vol. xxxiv. p. cxxxi. (Fig. 153.)

Award of Merit.

To *Begonia* 'Altrincham Pink' (votes, 9 for, 2 against), from Messrs. Clibrans, Altrincham. This variety belongs to the winter-flowering section obtained by crossing *B. socotrana* with tuberous varieties. It is remarkably free in flowering and the individual blooms are double and of a bright rose-pink colour.

To *Begonia* 'Glory of Cincinnati' (votes, 11 for, 3 against), from Mr. G. Lange, Hampton. A single rosy-pink variety of very vigorous habit. It is very free-flowering and the light green peltate foliage resembles that of *B. socotrana*. (Fig. 154.)

To Carnation 'Bath's Premier' (votes, 12 for, 1 against), from Messrs. Bath, Wisbech. A good clear yellow seedling from 'Mrs. T. W. Lawson,' which it resembles in habit. It is, however, more vigorous and blooms more freely than the parent. The flowers are of good size, perfect in shape, and have little or no scent.

To Chrysanthemum 'Isabel Gray' (votes, 12 for, 2 against), from Mr. P. Ladds, Swanley Junction. A single variety of good size and of a pleasing terra cotta colour.

To Chrysanthemum 'Mrs. David Syme' (votes, 19 for), from Messrs. Wells, Merstham. A good pure white decorative Chrysanthemum of large size with strong stems.

Other Exhibits.

W. B. M. Bird, Esq. (gr. Mr. A. Gooding), Chichester: *Primula malacoides*.

Messrs. Brown, Peterborough: *Plumbago rosea*.

Messrs. Fairbairn, Carlisle: Carnation 'Geisha.'

Messrs. Godfrey, Exmouth: Chrysanthemums.

L. F. Harrison, Esq. (gr. Mr. Chapman), East Grinstead: Chrysanthemums.

Mr. S. Holdrup, Covent Garden: Chrysanthemums.

Misses Hopkins, Shepperton: hardy plants.

Mr. W. G. Lewcock, Hampton: Chrysanthemum 'Mr. Bonar Law.'

Miss Ough, Streatham Common: flower pictures.

W. Parrott, Esq. (gr. Mr. Cox), Kintbury: Chrysanthemums.

Messrs. Peed, West Norwood: Begonias.

Mr. F. Pestifield, Swanley: Chrysanthemums.

Mr. G. Reuthe, Keston: Nerines and Saxifrages.

Mr. G. Scourfield, Neath: Chrysanthemum 'Miss Doris Wales.'

Mr. V. Slade, Taunton: Pelargoniums.

Captain Spender-Clay, M.P. (gr. Mr. Gibson), Lingfield: Carnations.

FLORAL COMMITTEE, DECEMBER 19, 1911.

Mr. H. B. MAY, V.M.H., in the Chair, and seventeen
members present.

Awards Recommended :—

Award of Merit.

To *Buddleia officinalis* (votes, unanimous), from Messrs. J. Veitch, Chelsea. A new species collected in China by Mr. E. H. Wilson. The flowers are borne in small terminal heads and are pale lilac in colour, with a zone of orange cadmium in the middle. The stems and the under-surfaces of the leaves are covered with soft woolly hairs which are also prominent on the calyx and the tube of the corolla. The leaves are lanceolate and dark green. The flowers have a very pleasing fragrance. The plant is not quite hardy at Coombe Wood, and the specimen exhibited was pot-grown and about 3 feet high.

Other Exhibits.

P. Bullivant, Esq., Beckenham: Chrysanthemum 'Mrs. Browne Bullivant.'

Mr. W. Iggulden, Frome: Chrysanthemum 'Christinas Bronze.'
Messrs. Wells, Merstham: Chrysanthemums.

ORCHID COMMITTEE.

SEPTEMBER 12, 1911.

Mr. HARRY J. VEITCH in the Chair, and fifteen members present.

Awards Recommended : —

Silver-gilt Flora Medal.

To Messrs. Sander, St. Albans, for a group.

Silver Flora Medal.

To Messrs. Charlesworth, Haywards Heath, for a group, principally hybrids.

Silver Banksian Medal.

To Samuel Larkin, Esq., Haslemere, for a group.

To Messrs. Stuart Low, for a group.

To Messrs. Hassall, for *Cattleya* × *iridescens* (*bicolor* × 'Eldorado') and other hybrids.

To Mr. E. V. Low, for a group.

First-class Certificate.

To *Sophrocattlaelia* × 'Jeanette' (*S. grandiflora* × *L.-c. Martinetii*) (votes, unanimous), from Messrs. Charlesworth. Comparable with the fine *Sophrocattleya* × 'Doris.' Flowers bright vermillion red with rose-tinted darker veining. Base of the lip yellow.

Cultural Commendation.

To Mr. W. H. White, orchid-grower to Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H., for a fine specimen of *Dendrobium glomeratum* with over thirty flowers.

Other Exhibits.

The Lady Audley Neeld: two hybrid *Cypripediums*.

R. G. Thwaites, Esq.: hybrids.

Messrs. Jas. Veitch: *Cattleya* × 'Carmen.'

H. S. Goodson, Esq.: *Laeliocattleya* × *Colmanii*.

W. P. Burkinshaw, Esq.: *Cypripedium* × 'Venus,' Hessele variety.

Sir Jeremiah Colman, Bart., V.M.H.: *Bulbophyllum orthoglossum*.

ORCHID COMMITTEE, SEPTEMBER 26, 1911.

Mr. HARRY J. VEITCH in the Chair, and sixteen members present.

Awards Recommended :—

Silver Banksian Medal.

To Samuel Larkin, Esq., Haslemere (gr. Mr. Hales), for *Laelio-cattleyas*, *Phalaenopses*, &c.

To Messrs. Charlesworth, for rare hybrids.

To Messrs. Sander, for a group.

To Messrs. Stuart Low, for a group.

To Messrs. Hassall, for hybrid *Cattleyas*, &c.

First-class Certificate.

To *Odontoglossum* × *Harwoodii*, The Shrubbery variety (*maculatum auriferum* × *Wiganianum*) (votes, unanimous), from Messrs. Charlesworth. Flowers bright yellow with blackish purple markings, and differing from the variety shown January 31, 1911, in having an elongated blackish blotch on each side of the labellum and one on the front lobe.

Award of Merit.

To *Cattleya* × 'Freya' var. 'Mrs. Frederick Sassoon' (*Dowiana aurea* × *Mantini* nigricans) (votes, unanimous), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). Flowers resembling *C. Mantini*, but much larger. Sepals and petals rosy-mauve, lip ruby-crimson, with thin gold lines from the base. (Fig. 155.)

To *Epidendrum Lauche*anum (votes, unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H. (gr. Mr. W. H. White). A remarkably slender species with a drooping raceme of small brownish flowers with yellow labellums.

Cultural Commendation.

To Mr. Jas. Hudson, V.M.H., gr. to Leopold de Rothschild, Esq., for a fine basket of the bright scarlet *Habenaria militaris*.

To Mr. W. H. White, orchid-grower to Sir Trevor Lawrence, Bart., K.C.V.O., for a fine plant of *Zygopetalum maxillare*.

Other Exhibits.

Leopold de Rothschild, Esq.: *Cattleya* × 'Iris,' ten flowers.

Francis Wellesley, Esq.: rare orchids.

R. G. Thwaites, Esq.: hybrids.

Baron Bruno Schröder: *Odontoglossum* × 'Memoria Baron Schröder.'

H. S. Goodson, Esq.: a group.

Mr. E. V. Low: a group.

Messrs. Jas. Veitch: hybrid orchids, &c.

W. Waters Butler, Esq.: *Cattleya* × *Hardyana* var. *Massaiana*.



FIG. 156. - *CYPRIPEDIUM* × 'LUCIFER.' (*Gardeners' Chronicle*.) (p. celi.)

(To face p. celi.)



FIG. 159. *CYPRIPEDIUM* × *CHAPMANII*, WESTONBIRT VARIETY.
(*Gardeners' Chronicle*.) (p. celvi.)

ORCHID COMMITTEE, OCTOBER 10, 1911.

Mr. J. GURNEY FOWLER in the Chair, and seventeen members present.

Awards Recommended :—*First-class Certificate.*

To *Cypripedium* × 'Lucifer' ('Niobe,' Westonbirt variety × 'Hera Euryades') (votes, 11 for, 2 against), from Lieut.-Colonel Sir George L. Holford, K.C.V.O., Westonbirt (gr. Mr. H. G. Alexander). A fine hybrid, nearest to *C.* 'Niobe,' Westonbirt variety, but with larger flowers. Dorsal sepal white, heavily tinged and veined with rose-purple, the base being green with a few black spots. Petals and lip, mahogany-red on primrose-yellow ground. (Fig. 156.)

To *Cypripedium* × 'Royal George' (*Harrisianum superbum* × 'Minos' *Youngii*) (votes, 11 for, 2 against), from Messrs. Armstrong & Brown, Tunbridge Wells. Flowers large, dorsal sepal white with a small green base from which extend dotted lines of purple with a rose-purple flush between them. Petals and lip resembling *C. Breckmanii*, yellowish tinged with purple-brown. (Fig. 157.)

To *Odontioda* × 'Euterpe' (*Cochlioda Noezliana* × *Odontoglossum* × *Uro-Skinnei*) (votes, unanimous), from Messrs. Charlesworth. Sepals and petals orange-scarlet, lip rounded in front, closely mottled with rosy-mauve.

Other Exhibits.

E. H. Davidson, Esq., Twyford: *Taeliocattleya* × *Davidsoniae* (*L.-c.* × 'Bella' × *C. labiata*).

Messrs. Armstrong & Brown: three hybrids of *Cypripedium Fairieanum*.

Messrs. Hassall: *Cattleya* × *Hassallii* (*labiata* × 'Empress Frederick').

Messrs. Charlesworth: rare orchids.

Mr. E. V. Low: Cattleyas.

Messrs. Mansell & Hatcher: *Miltonia candida superba*.

J. Bridson Seale, Esq.: *Miltonia Karwinskii*.

Messrs. McBean: *Miltonia vexillaria Leopoldii*.

ORCHID COMMITTEE, OCTOBER 24, 1911.

Mr. J. GURNEY FOWLER in the Chair, and twenty members present.

Awards Recommended :—*Silver Flora Medal.*

To Messrs. Sander, St. Albans, for Cattleyas and rare species.

To Messrs. Charlesworth, for hybrids.

To Messrs. Hassall, Southgate, for *Cattleya labiata*, *C.* × 'Fabia,' &c.

To Messrs. Stuart Low, Enfield, for a group.

To Messrs. Cypher, Cheltenham, for *Cypripediums*, &c.

To Messrs. Armstrong & Brown, Tunbridge Wells, for a group.

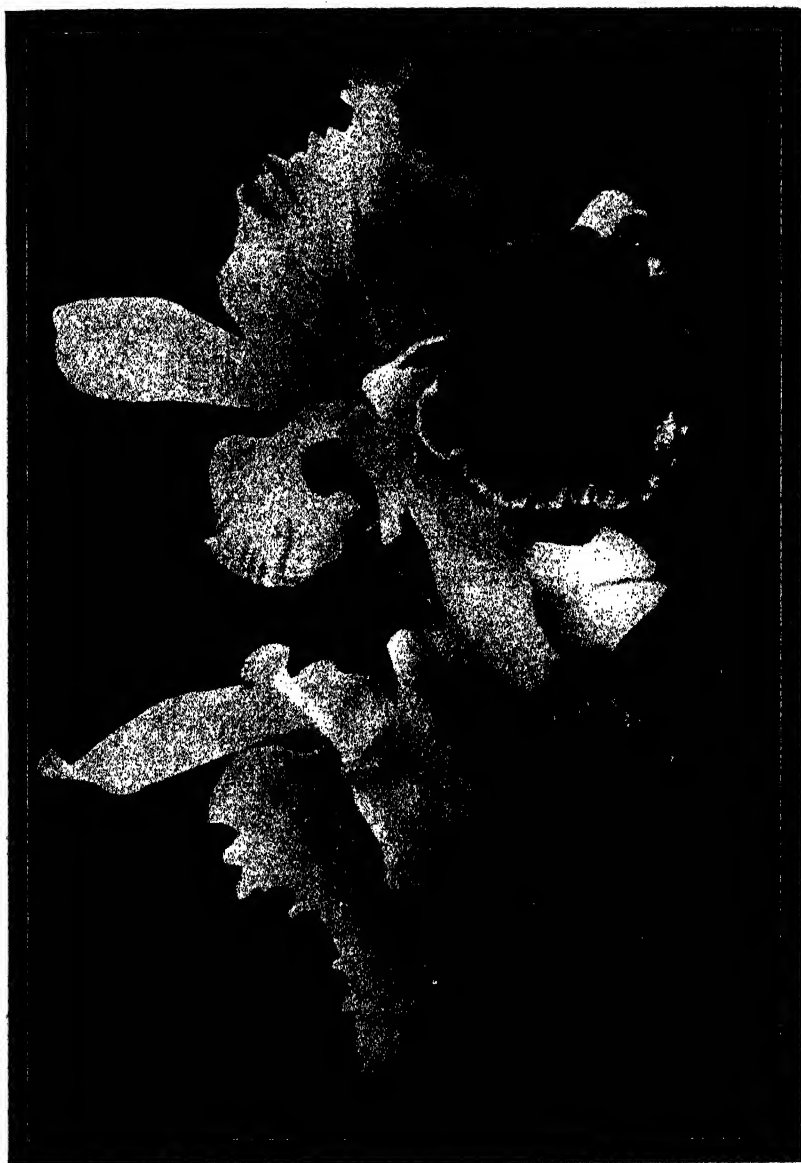


FIG. 160.—*LASIOCATTLEYA* X 'ST. GOTHEARD,' McBEAN'S VAR. (*Gardener's Magazine*.) (p. ccliii.)

Silver Banksian Medal.

To Messrs. McBean, Cooksbridge, for a group.

To Monsieur Chas. Maron, Brunoy, France, for hybrids.



FIG. 161.- *LAPLIOCAULEYA X LUMINOSA ACREA* (p. celtii.)

(To *lus p. celtii*.)



FIG. 162.—GENTIANA × ASHIKUNII ALBA. (P. GRIFF.)

First-class Certificate.

To *Laeliocattleya* × *luminosa aurea* (*L. tenebrosa* 'Walton Grange' × *C. Dowiana aurea*) (votes, unanimous), from Lieut.-Colonel Sir George L. Holford, K.C.V.O. (gr. to Mr. H. G. Alexander). A large and distinct flower. Sepals and petals greenish primrose, lip deep claret-red. (Fig. 161.)

To *Laeliocattleya* × 'St. Gothard,' McBean's variety (*L.-c.* × *Gottoiana* × *C. × Hardyana*) (votes, 16 for, 2 against), from Messrs. McBean, Cooksbridge. A large flower of fine shape, bright rose with a dark ruby-crimson lip having a yellow disc. (Fig. 160.)

Award of Merit.

To *Vanda Kimballiana alba* (votes, unanimous), from Messrs. Mansell & Hatcher, Rawdon. Flowers white with a pale yellow base to the lip.

Other Exhibits.

Lieut.-Colonel Sir George L. Holford: *Cypripedium* × 'Oberon' ('Euryades' × *Fairrieanum*).

Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H.: *Octomeria crassifolia*.

Francis Wellesley, Esq.: *Laeliocattleyas*.

Edward Roberts, Esq.: *Cypripedium* × 'Gipsy.'

Monsieur le Comte de Hemptinne: *Cattleya* × *Steppstediana* (*Luddemanniana* × *aurea*) = *Kienastiana*.

Mr. E. V. Low.: *Brassocattleyas*.

Frank Lloyd, Esq.: *Sophrrolaelia* ×

W. P. Burkinshaw, Esq.: *Cypripediums*.

ORCHID COMMITTEE, NOVEMBER 7, 1911.

MR. J. GURNEY FOWLER in the Chair, and twenty-four members present.

Awards Recommended:—*Lindley Medal.*

To G. F. Moore, Esq., Bourton-on-the-Water (gr. Mr. Page), for a group of *Dendrobium Phalaenopsis Schroderianum*, most of which had been in his collection for eighteen years.

Silver Flora Medal.

To E. R. Ashton, Esq., Tunbridge Wells (gr. Mr. A. Young), for showy *Cattleyas* and *Laeliocattleyas*.

To Messrs. J. Cypher, Cheltenham, for *Cypripediums*, &c.

To Messrs. Sander, St. Albans, for a group.

To Messrs. Charlesworth, Haywards Heath, for hybrids and *Vanda coerulea*.

Silver Banksian Medal.

To Messrs. Hassall, Southgate, for a *Cattleya labiata* and hybrids.

To Messrs. Stuart Low, Enfield, for a group.

To Messrs. McBean, Cooksbridge, for a group.

Bronze Banksian Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for rare *Cypripediums*.

First-class Certificate.

To *Cattleya* × *Ashtonii* *alba* (*Harrisoniana* × *Warscewiczii*) (votes,



FIG. 163.—*CALANTHE* × *COOKSONIAE* (*Garden.*) (p. cclv.)

unanimous), from Messrs. Sander. Flowers of good shape, white, with chrome-yellow disc to the lip. (Fig. 162.)

To *Calanthe* × *Cooksoniae* (*Sedenii Harrisii* × *rubro-oculata gigantea*) (votes, unanimous), from Mrs. Norman Cookson, Oakwood, Wylam (gr. Mr. H. J. Chapman). Flowers large, pure white. (Fig. 163.)

Award of Merit.

To *Cypripedium* × 'Sibyl' *superbum* (*Goultianum* × *Fairrianum*) (votes, unanimous), from Mrs. Norman Cookson. Flowers like a large *C. vexillarium*, tinged with rose and bearing dark markings.

Vote of Thanks.

To His Grace the Duke of Devonshire, Chatsworth (gr. Mr. Jennings), for a fine example of *Renanthera coccinea*, the spike having five branches; the flowers bright red.

Other Exhibits.

W. R. Lee, Esq.: *Cypripedium* × 'King George.'

Francis Wellesley, Esq.: hybrid *Cattleya*.

Mr. E. V. Low: *Cypripediums*.

J. Gurney Fowler, Esq.: *Cymbidium Tracyanum*.

Mr. G. W. Miller: *Cypripediums*.

Mrs. Norman Cookson: hybrids.

Gurney Wilson, Esq.: *Cattleya labiata*.

E. H. Davidson, Esq.: two hybrids.

C. J. Lucas, Esq.: White *Brassocattleya*.

ORCHID COMMITTEE, NOVEMBER 21, 1911.

Mr. J. GURNEY FOWLER in the Chair, and twenty-three members present.

Awards Recommended :—

Gold Medal.

To His Grace the Duke of Marlborough, Blenheim (gr. Mr. Hunter), for a very fine and well-arranged group of *Vanda coerulea*, *Cypripedium insigne Sanderae*, &c.

Silver Flora Medal.

To H. S. Goodson, Esq., Putney (gr. Mr. G. E. Day), for *Laelio-cattleyas*, *Odontoglossums*, &c.

To Messrs. Charlesworth, for a group.

To Messrs. Sander, for a group.

To Messrs. J. Cypher, for *Cypripediums*.

Silver Banksian Medal.

To Messrs. Hassall, Southgate, for *Cattleyas*.

To Messrs. McBean, for a group.

To Messrs. Stuart Low, for a group.

To Mr. E. V. Low, for *Cypripediums*, &c.

To Messrs. W. Baylor Hartland, Cork, for a group.

First-class Certificate.

To *Laeliocattleya* × 'Prince of Orange' (*L.-c.* × 'Hippolyta' × *C. Dowiana aurea*) (votes, 16 for, 4 against), from Lieut.-Col. Sir George L. Holford, K.C.V.O. (gr. Mr. H. G. Alexander). Flowers seven on a spike, golden-yellow with ruby-red labellum. (Fig. 158.)

To *Brassocattleya* × *Digbyano-Mossiae*, Holford's variety (*B. Digbyana* × *C. Mossiae Reineckiana*) (votes, unanimous), from Lieut.-Col. Sir George L. Holford. Flowers very large, silver white, with greenish-primrose disc to the lip. (Fig. 166.)

To *Cypripedium* × *Chapmanii*, Westonbirt variety (*bellatulum* × *Curtisii*) (votes, 20 for, 1 against), from Lieut.-Col. Sir George L. Holford. Flowers of the largest of the section, cream-white, heavily spotted and lined with claret-purple. (Fig. 159.)

To *Odontoglossum* × 'Chione' (parentage unrecorded) (votes, unanimous), from W. R. Lee, Esq., Heywood, Manchester (gr. Mr. Woodhouse). Flowers claret tipped with white and with slight white markings at the bases of the petals. (Fig. 164.)

To *Odontoglossum* × 'Thais' (parentage unrecorded) (votes, 14 for, 4 against), from W. R. Lee, Esq. Flowers large and of good shape, white, heavily blotched with rose-purple. (Fig. 165.)

Award of Merit.

To *Laeliocattleya* × *Denganii* (*L.-c.* × *Cappei* × *C. Dowiana*) (votes, unanimous), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). Flower formed like *C. Dowiana*, but smaller. Sepals and petals golden yellow tinged with copper-red, lip bright ruby-crimson veined with gold.

To *Laeliocattleya* × 'W. J. Biggs' (parentage unrecorded) (votes, unanimous), from W. J. Biggs, Esq., Enfield. A very neat flower with bronzy-gold sepals and petals and ruby-claret lip.

To *Brassocattleya* × *Leucothoe* (*B. nodosa* × *C. Schroderae*) (votes, unanimous), from Messrs. McBean. Habit dwarf, flowers three inches across, white.

Cultural Commendation.

To Mr. W. H. White, orchid-grower to Sir Trevor Lawrence, Bart, K.C.V.O., for finely-grown *Maxillarias*.

Other Exhibits.

Lieut.-Col. Sir George L. Holford, K.C.V.O.: *Cattleya Harrisoniana*, Stanley's variety.

Messrs. Jas. Veitch: *Cypripedium nitens* 'James O'Brien.'

Francis Wellesley, Esq.: white *Cattleya labiata*.

The Lady Audley Neeld: *Cypripediums*.
 Captain Laycock: *Laeliocattleya* × 'Hy. Greenwood.'
 Messrs. Edgar: *Cypripedium insigne* seedling.
 Monsieur Maurice Mertens: *Odontoglossums*.

ORCHID COMMITTEE, DECEMBER 5, 1911.

Mr. J. GURNEY FOWLER in the Chair, and twenty-two members present.

Awards Recommended :—

Silver Flora Medal.

To J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis), for a group of rare *Cypripediums*.

To Messrs. Armstrong & Brown, Tunbridge Wells, for an extensive group of hybrid *Cypripediums* and other orchids.

To Messrs. Jas. Veitch, Chelsea, for a group of *Cypripediums*, *Laeliocattleyas*, and the new *Odontoglossum* × 'Aurora' (*Rossii rubescens* × *Iambeauium*).

To Messrs. Charlesworth, Haywards Heath, for rare hybrids.

To Messrs. McBean, Cooksbridge, for a group.

To Messrs. Sander, St. Albans, for a group.

To Messrs. J. Cypher, Cheltenham, for *Cypripediums*.

Silver Banksian Medal.

To Messrs. Stuart Low, Bush Hill Park, for a group.

To Messrs. W. Baylor Hartland, Cork, for a group.

Bronze Banksian Medal.

To Mr. E. V. Low, Haywards Heath, for *Cypripediums*.

To Messrs. Mansell & Hatcher, Rawdon, Yorks, for a group.

First-class Certificate.

To *Sophrocattleya* × 'Lotte Müller' (*C.* × *Peetersii* × *S.-c.* × 'Nydia') (votes, unanimous), from Messrs. Charlesworth. A fine hybrid of dwarf growth. Flowers bright rose and ruby-red, lip ruby-crimson with gold veining at the base.

Award of Merit.

To *Cypripedium* × 'Draco,' Westonbirt variety (*insigne* 'Harefield Hall' × 'Euryades') (votes, unanimous), from Lieut.-Col. Sir George L. Holford, K.C.V.O. (gr. Mr. H. G. Alexander). Flowers resembling *C. insigne* 'Harefield Hall,' but longer and darker.

To *Trichopilia* × *Gouldii* (*suavis* × *fragrans*) (votes, unanimous), from Messrs. Charlesworth. Flowers intermediate between the two parents, but with the characters of *Trichopilia* (*Pilumna*) *fragrans* well displayed; white, with rose-pink spotting.

Other Exhibits.

Francis Wellesley, Esq.: hybrids.

Sir Jeremiah Colman, Bart., V.M.H.: *Cypripedium insigne*, Gatton Park variety.

F. Bostock, Esq.: *Cypripedium* × 'Actaeus.'

Mrs. Norman Cookson: rare orchids.

E. H. Davidson, Esq.: white *Cattleya*.

Messrs. Hassall: a group.

Miss Walters Anson: coloured drawings.

ORCHID COMMITTEE, DECEMBER 19, 1911.

Mr. HARRY J. VEITCH in the Chair, and fourteen members present.

Awards Recommended:—

First-class Certificate.

To *Laeliocattleya* × 'Nella' (*L.-c.* × *Dominiana* × *C. labiata*) (votes, 8 for, 4 against), from Messrs. Jas. Veitch, Chelsea. In colour and form a very beautiful hybrid. Sepals and petals bright rose with faint whitish veining and a white spot at the base of each segment. Lip glowing ruby-red with thin yellow lines from the base. (Fig. 167.)

Cypripedium × 'Royal Sovereign' ('Hera' *robustum* × 'Urania') (votes, 8 for, 4 against), from Messrs. Sander, St. Albans. A very distinct hybrid with large white dorsal sepal heavily marked with spotted and feathered lines of deep claret. Petals and lip tinged with mahogany-red. (Fig. 168.)

Award of Merit.

To *Cypripedium* × 'Lord Wolmer,' Westonbirt variety (*Leeanum* × 'Hera Euryades') (votes, unanimous), from Lieut.-Col. Sir George L. Holford, Westonbirt (gr. Mr. H. G. Alexander). Flower nearest to *C.* × 'Hera Euryades,' dorsal sepal white spotted with dark purple, the lower sepals being enlarged abnormally and coloured on the sides like the dorsal sepal. Petals and lip yellowish tinged and veined with purple.

To *Odontoglossum crispum* 'Alcyone' (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands (gr. Mr. J. Davis). Flowers white, slightly tinged with purple; sepals blotched sepia-brown, the middles of the petals bearing a cluster of small purple spots.

To *Cypripedium* × 'Actaeus' var. 'Durbar' (*insigne* 'Harefield Hall' × *Leeanum giganteum*) (votes, unanimous), from Messrs. Charlesworth). Flower with the general characters of *C. insigne* 'Harefield Hall,' but much broader, and the lip remarkably short.

To *Cypripedium insigne*, Gatton Park variety (votes, unanimous), from Sir Jeremiah Colman, Bart., V.M.H. (gr. Mr. Collier). The result of fertilizing *C. insigne* 'Harefield Hall' with a good form of *C. insigne montanum*. Flowers large, coloured like *C. nitens*, and with purple spots on the white upper third of the dorsal sepal.



FIG. 166. —BRASSOCATTLEVA × DICBYANO-MOSSIAE, HOLFORD'S VARIETY. (*Gundovers' Chionoch.*) (p. cclvi.)

(*Trofæus p. cclviii.*)



FIG. 167. *Laeliocaulis* 'Nella' (*Gardener's Magazine*) (p. cclviii.)



FIG. 168.—*CYPRIPEDIUM* × 'ROYAL SOVEREIGN.' (*Sander.*) (p. cclviii.)

Other Exhibits.

Francis Wellesley, Esq. : *Brassocattlueia* × *Veitchii* and others.

The Lady Audley Neeld : *Cattleya* × 'Venus.'

Sir Jeremiah Colman, Bart. : *Odontioda* × 'Diana.'

Mr. E. V. Low : *Cypripediums*.

Messrs. Sander : *Cypripediums*.

Messrs. Stuart Low : *Vanda Amesiana albens*.

Messrs. Jas. Veitch : *Cypripediums*.

RECOGNITION OF CHILDREN'S WORK IN PLANT LIFE.

The Council have founded a card of "Recognition of Diligent Interest in Plants," to be bestowed upon children as an encouragement to work carefully and interestedly in plant life.

The "Recognition" has been sent to the following during 1911:—

Mar. 23.	To Dora Bourne,	First in the Bulb Competition, Abbey Road School, Oldbury.
Mar. 25.	To Lily Phillips,	First in the Bulb Competition for girls over ten, Bransgore and Burley School.
„ „	To Harry Roff,	First in the Bulb Competition for boys over ten, Bransgore and Burley School.
July 6.	To Charles Martin,	For the best School Garden Plot, S. Merstham Hort. Soc.
July 15.	To Grace Lovett,	First in the pot Fuchsia Competition, St. James's, Upper Edmonton, Flower, &c., Guild.
„ „	To Willie Shields,	First in the pot Geranium Competition, St. James's, Upper Edmonton, Flower, &c., Guild.
Aug. 4.	To Charles Hollebon, and Albert Levett,	For the joint upkeep of the best School Garden Plot, Hailsham Council School.
Nov. 8.	To Charles King,	First in the boys' Chrysanthemum Competition, Eastbourne Horticultural Society.
„ „	To Dorothy Miller,	First in the girls' Chrysanthemum Competition, Eastbourne Horticultural Society.
Nov. 21.	To Violet Godfrey,	(Wandsworth Common) For water-colour drawings of flowers.

ESTABLISHED
1804.INCORPORATED
1809.

TELEGRAMS

"HORTENSIA, LONDON."

TELEPHONE :

5363 VICTORIA

ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W.

NOTICES TO FELLOWS.

- | | |
|--|--|
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| 17. The Wisley Research Station. | 38. Advertisements. |
| 18. Students at Wisley. | 39. Shirley Poppies. |
| 19. Distribution of Surplus Plants. | 40. International Horticultural Exhibition, May 22-30, 1912. |
| 20. Exhibitions, Meetings, and Lectures in 1912. | |
| 21. Dates fixed for 1912. | |

1. GENERAL.

Notices to Fellows are always added at the end of each number of the JOURNAL, immediately preceding the Advertisements, and also at the beginning both of the "Book of Arrangements" and of the "Report of the Council." Fellows are particularly requested to consult these Notices, as it would often save them and the Secretary much needless correspondence.

2. LETTERS.

All letters on *all* subjects should be addressed—The Secretary, Royal Horticultural Hall, Vincent Square, Westminster, S.W.

3. TELEPHONE AND TELEGRAMS.

Telephone Number : **5363 VICTORIA.**

"HORTENSIA, LONDON," is sufficient address for telegrams.

4. JOURNALS WANTED.

The Secretary would be greatly obliged by the return to the Society of ANY NUMBERS of the JOURNAL which may be of no further use to Fellows. Complete sets are occasionally applied for, but, at the present moment, not even one can be supplied owing to the stock of the following being exhausted :—

VOLUME IV. Part 14.

VOLUME XIII. Part 1.

VOLUME V. Part 1.

VOLUME XIV.

VOLUME X.

VOLUME XV. Parts 2 and 8.

These are therefore particularly asked for.

5. SUBSCRIPTIONS.

All Subscriptions fall due on January 1st of each year. To avoid the inconvenience of remembering this, Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments ; or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1st. It may be a week or more before the Tickets reach the Fellows, owing to the very large number (over 20,000) to be despatched within the first month of the year. Fellows who have not already given an order on their bankers for the payment of their subscriptions each year are requested to do so, as this method of payment is preferred, and saves the Fellows considerable trouble. Fellows whose subscriptions remain unpaid are debarred from all the privileges of the Society ; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

In paying their subscriptions, Fellows often make the mistake of drawing their cheques for Pounds instead of for Guineas. Kindly note that in all cases it is Guineas, and not Pounds. Cheques and Postal Orders should be made payable to "The Royal Horticultural Society" and crossed "London County and Westminster Bank, Victoria Branch, S.W."

6. FORM OF BEQUEST.

I give and bequeath to the Treasurer for the time being of the Royal Horticultural Society, London, the sum of £....., to be paid out of such part of my personal estate as I can lawfully charge with the payment of such legacy, and to be paid free of legacy duty, within six months of my decease ; the receipt of such Treasurer to be a sufficient discharge for the same. And I declare that the said legacy shall be applied towards [the general purposes of the Society].*

* Any special directions or conditions which the testator may wish to be attached to the bequest may be substituted for the words in brackets.

7. PRIVILEGES OF CHEMICAL ANALYSIS.

Instructions are contained at page 84 in the "Book of Arrangements," 1912.

8. LIST OF FELLOWS.

A list of all the Fellows of the Society is sent out in January. Fellows are requested to look at their own names in it, and if in any way these are incorrect, or the address insufficient, they are requested to inform the Secretary at once. Forms of Nomination, and of the Privileges of Fellows, are bound in with every number of the JOURNAL (Advt. pp. 82, 88) and the "Book of Arrangements."

9. NEW FELLOWS.

The President and Council fully appreciate how much the prosperity of the Society and its present large number of Fellows are due to the efforts of Fellows to enlist the sympathy of their friends; and the steady advance during recent years indicates the increasing recognition of the Society's work and usefulness. But it must not be supposed that a maximum has yet been reached. There is ample room for a great increase of Fellows, especially in America and the Colonies.

10. AN APPEAL.

What has been accomplished for the Society since 1887 is largely due to the unwearied assistance afforded by a small proportion of the Fellows; but as all belong to the same Society, so it behoves each one to do what he or she can to further its interests, especially by:—

1. Increasing the number of Fellows.
2. Helping to swell the General Prize Fund started by Mr. A. W. Sutton, V.M.H., for providing Prizes for the Students at Wisley.
3. Providing lectures with lantern slides.
4. Presenting books to fill the gaps in the Library both at Vincent Square and at Wisley.
5. Sending new and rare Plants and Seeds for the Garden and surplus Roots for distribution to the Fellows.
6. Sending Plants for the *New Rock Garden* at Wisley.

Thus there is plenty for all to do according to their individual liking: personal effort, money, plants, books, are all alike needed. The Secretary asks those who read these lines to help in the ways above indicated.

11. R.H.S. GARDENERS' DIARY.

The Shropshire Horticultural Society's Show appears in the Gardeners' Diary under the dates August 22 and 23. The correct dates are August 21 and 22. Will Fellows please alter their Diaries accordingly?

12. LINDLEY LIBRARY.

The Society acting in and through its Council, having now become sole trustee of the Lindley Library, Fellows and friends of the R.H.S.

have the encouragement of knowing that their gifts to the Library can never be lost to the Society, but are attached to it in perpetuity. It should now be the aim of all to make the Library far more perfect and complete than it is at present. Gifts of books, old or new, will be gratefully accepted.

13. THE SOCIETY'S GARDENS AT WISLEY.

The Gardens are open daily to Fellows and others showing Fellows' Transferable Tickets, from 9 A.M. till sunset, except on Sundays, Good



POSITION OF THE SOCIETY'S GARDENS.

Friday, Christmas Day, and Exhibition Days. Each Fellow's Ticket admits three to the Gardens. The Public are not admitted.

The Gardens, situated at Wisley (about 2 miles from Ripley, in Surrey), are about 8 miles from Byfleet, $3\frac{1}{2}$ miles from Horsley, and $5\frac{1}{4}$ miles from Weybridge, all stations on the South-Western Railway, with frequent trains from Waterloo and Clapham Junction. Carriages to convey four persons can be obtained by writing to Mr. D. White, fly proprietor, Ripley, Surrey; the charge being, to and from Weybridge, waiting two hours at the Gardens, 8s.; or waiting three hours, 10s.; or to and from Horsley, 7s.; Effingham Junction, 7s.; Byfleet, 7s.

Visitors should in all cases be careful to state the trains they intend to arrive by and leave by. Carriages can also be obtained at Weybridge for 8s. by writing to Mr. Trembling, New Road, Weybridge. Excellent accommodation and refreshments can be had at the Hut Hotel, close to the Gardens, and also at the Hautboy at Ockham.

The motor route from London to Wisley will be found in the "Book of Arrangements," p. 123.

14. ROCK GARDEN AT WISLEY.

In consequence of the rapidly increasing interest taken in what are popularly called "Alpine Plants," "Alpines," or "Rock Plants," the Council have constructed a Rock Garden at Wisley on a somewhat extensive scale. The idea is to obtain the best possible positions and soils for the different plants to grow in, the growth and well-being of the plants being considered to be of even greater importance than the artistic effect of the rockwork. In a Horticultural Society's Garden every single detail should teach something, so that Fellows visiting it may be able to take away an idea of how best to do this or that or where best to plant this or that. The construction of the Rock Garden is completed, and the planting is proceeding, but it will be two, or possibly three, years or more before the plants on it can be seen at their best.

15. NEW BOTHY AT WISLEY.

The Council have always been anxious to promote the welfare of their gardeners, and with this object in view they have recently completed a new bothy, which they hope may prove of use far and wide as establishing the desirable *via media* between extravagance on the one hand and disregard of the men's comfort on the other. It may well serve as a model for the construction of bothies elsewhere.

16. TRIALS AT WISLEY IN 1912-13.

The Special Regulations for the direction of Trial Sub-Committees will be found on p. 81, Book of Arrangements.

N.B.—Everything sent for trial *must be named*, and the name and address of the sender attached.

Fruit.

Strawberries, Autumn Fruiting.—20 runners of each.

Melons. Not less than six seeds of each in February.

Fruit berries.—Three plants of each by February. Strawberries, Raspberries, Gooseberries, Currants excluded.

Flowers.

Cape Pelargoniums.—Two cuttings of each (rooted or otherwise) as soon as possible. See next page.

Violas.—Six plants of each to be sent in February.

Bedding Pelargoniums (Geraniums).—Three plants of each in May.

Montbretias.—Six corms of each in February.

Kniphofias (Tritomas).—Three plants of each in February.

Lobelias of the cardinalis, fulgens, and syphilitica sections.—Three plants of each in February.

Vegetables.

Vegetable Marrows.—Not less than six seeds of each variety in February.

Potatos.—Early and mid-season. Each variety must be labelled as being "early" or "mid-season." Twenty tubers of each by February.

Trial of Cape Pelargoniums.

The Council of the Royal Horticultural Society have been asked to endeavour to obtain an agreement on the Nomenclature of what are commonly known as Cape Pelargoniums. The only practical way known to the Council is to invite all growers of these plants to *at once* send cuttings (rooted or otherwise) with the name known to the sender attached, by post to the Superintendent, R.H.S. Gardens, Wisley, Ripley, Surrey. They will be potted up and next year be compared with each other, and with herbarium specimens, and printed records. No Zonals or Show or French Pelargoniums should be sent; only those known as 'Cape.'

If sent by post: The Superintendent, R.H.S. Gardens, Wisley, Ripley, Surrey.

If sent by rail: The Superintendent, R.H.S. Gardens, Wisley, Horsley Station, L. & S.-W. R., with advice by post to the Superintendent.

17. THE WISLEY RESEARCH STATION.

Investigations are now in full swing at the new Research Station and Laboratory at Wisley. All communications relating to them should be addressed to Mr. F. J. Chittenden, F.L.S., Director of the Research Work on Scientific Matters affecting Practical Horticulture, and Lecturer to the Students.

18. STUDENTS AT WISLEY.

N.B.—There will be a few vacancies for the two years' Course commencing on March 25, 1912. Early application should be made to the Secretary.

The Society admits young men, between the ages of 16 and 22 years, to study Gardening at Wisley. The curriculum includes not only practical garden work in all the main branches of Horticulture, but also lectures, demonstrations, and Elementary Horticultural Science in the Laboratory, whereby a practical knowledge of simple Garden Chemistry, Biology, &c., may be obtained. The Laboratory is equipped with the best apparatus procurable for Students. The training extends over a period of two years, with a progressive course for each year. Students can only enter at the end of September or at the end of March. Selected Students have also the advantage of attending certain of the Society's Shows and Lectures in London.

19. DISTRIBUTION OF SURPLUS PLANTS.

In a past Report the Council drew attention to the way in which the annual distribution of surplus plants has arisen. In a large garden there must always be a great deal of surplus stock, which must either be given away or go to the waste heap. A few Fellows, noticing this, asked for plants which would otherwise be discarded; and they valued what was so obtained. Others hearing of it asked for a share, until the Council felt they must either systematize this haphazard distribution or else put a stop to it altogether. To take the latter step seemed undesirable. Why should not such Fellows have them as cared to receive such surplus plants? It was therefore decided to keep all plants till the early spring, and then give all Fellows alike the option of claiming a share of them by Ballot.

Fellows are therefore particularly requested to notice that only waste and surplus plants raised from seeds or cuttings are available for distribution. Many of them may be of very little intrinsic value, and it is only to avoid their being absolutely wasted that the distribution is permitted. The great majority also are, of necessity, *very small*, and may require careful treatment for a time.

Fellows are particularly requested to note that a Form of Application and list to choose from of the plants available for distribution is sent in January *every year* to every Fellow, enclosed in the "Report of the Council." To avoid all possibility of favour, all application lists are kept until the last day of February, when they are all thrown into a Ballot; and as the lists are drawn out, so is the order of their execution, the plants being despatched as quickly as possible after March 1.

Of some of the varieties enumerated the stock is small, perhaps not more than twenty-five or fifty plants being available. It is therefore obvious that when the Ballot is kind to any Fellow he will receive the majority of the plants he has selected, but when the Ballot has given him an unfavourable place he may find the stock of almost all the plants he has chosen exhausted. A little consideration would show that all Fellows cannot be first, and some must be last, in the Ballot. Application forms received after March 1 and before April 30 are kept till all those previously received have been dealt with, and are then balloted in a similar way. Fellows having omitted to fill up their application form before April 30 must be content to wait till the next year's distribution. The work of the Gardens cannot be disorganized by the sending out of plants at any later time in the year. All Fellows can participate in the annual distribution *following* their election.

The Society does not pay the cost of packing and carriage. The charge for this will be collected by the carriers on delivery of the plants, which will be addressed exactly as given by each Fellow on his application form. It is impracticable to send plants by post, owing to the lack of Post Office facilities for despatch without prepayment of postage.

Fellows residing beyond a radius of thirty-five miles from London are permitted to choose double the number of plants to which they are otherwise entitled.

Plants cannot be sent to Fellows residing outside the United King-

dom, owing either to length of time in transit or to vexatious regulations in some foreign countries; but the Council will at any time endeavour to obtain for Fellows living abroad any unusual or rare seeds which they may have been unable to procure in their own country.

No plants will be sent to Fellows whose subscription is in arrear, or who do not fill up their forms properly.

20. EXHIBITIONS, MEETINGS, AND LECTURES IN 1912.

The programme will be found in the "Book of Arrangements" for 1912. An Exhibition and Meeting is held practically every fortnight throughout the year, and a short lecture on some subject connected with Horticulture is delivered during the afternoon.

A reminder of every Show will be sent in the week preceding to any Fellow who will send to the R.H.S. Offices, Vincent Square, S.W., a sufficient number (34) of halfpenny cards *ready addressed* to himself.

21. DATES FIXED FOR 1912.

Jan. 9, 23	July 2-4 (Summer Show), 9 & 10
Feb. 6, 13 (Annual Meeting only), 20	(Sweet Peas), 16, 23 (Carnations), 30
March 5 and 6 (Bulb Show), 19, 21-22 (Carnations)	Aug. 13, 27
April 2, 16 and 17 (Daffodils), 30	Sept. 10, 12 (Autumn Rose Show), 24 (Vegetables)
May 14	Oct. 8, 10-11 (Fruit Show), 22
June 4, 18, 19 (Hardy Plants)	Nov. 5 and 6 (Orchids), 19
	Dec. 3, 4 (Carnations)

22. CHALLENGE CUPS.

(a) *For Roses.*

To commemorate his period of office as a member of the Council, Mr. A. L. Wigan has presented a Silver Challenge Cup for award by the Council to the best exhibit of Roses. This year it is offered in open competition at the Holland House Show. (See p. 61, "Book of Arrangements.")

(b) *For Vegetables.*

A handsome Silver-gilt Challenge Cup has been presented to the Society by Messrs. Sutton, of Reading, and the Council will again offer it, with £10, for vegetables on September 24, 1912. The Society also offers a Champion Challenge Cup for the greatest number of points obtained by any one exhibitor throughout the same Exhibition, the winner of the Sutton Cup being excluded. These Cups may be won by the same exhibitor only once in three years, but he may compete every year for any second prize that may be offered.

23. FARRER CUP FOR ROCK PLANTS.

Mr. Reginald Farrer has presented a Silver Cup to the Council for award to Rock Plants, on June 4. (See p. 59, "Book of Arrangements.")

24. SHOWS OF DAFFODILS AND ORCHIDS, 1912.

The Society will hold a Show of Daffodils on April 16 and 17, when Cups and Medals will be awarded. For the Schedule, apply to the Secretary, R.H.S., Vincent Square, London, S.W.

To demonstrate the value of hybrid Orchids as autumn flowering plants, an Exhibition will be held on November 5 and 6; Cups and Medals are offered. See Book of Schedules to be issued in March.

25. SPRING SHOW OF FORCED BULBS.

A Special Spring Exhibition of Forced Bulbs will be held on March 5 and 6, 1912. The object of this Show is to demonstrate the varieties best suited for gentle forcing, and exhibits of small and large collections are invited from Amateurs and the Trade. R.H.S. Medals will be awarded according to merit.

The Council also offer (subject to the General Rules of the Society) the following Prizes presented to them by the General Bulb Growers' Society of Haarlem:—

Division I.—For Amateurs.

Class 3.—Eighteen Hyacinths, distinct.

1st Prize . . .	£6 6s.	4th Prize . . .	£3 3s.
2nd „ . . .	£5 5s.	5th „ . . .	£2 2s.
3rd „ . . .	£4 4s.	6th „ . . .	£1 1s.

Class 4.—Twelve Hyacinths, distinct.

1st Prize . . .	£5 5s.	4th Prize . . .	£2 2s.
2nd „ . . .	£4 4s.	5th „ . . .	£1 1s.
3rd „ . . .	£3 3s.		

Class 5.—Six Hyacinths, distinct.

1st Prize . . .	£2 2s.	3rd Prize . . .	£1 1s.
2nd „ . . .	£1 10s.	4th „ . . .	10s.

Class 6.—Four pans containing Hyacinths, ten roots of one variety in each pan. The blooms of each pan to be of distinctly different colour from those of the other three pans. The bulbs need not have been actually grown in the pans they are shown in.

1st Prize . . .	£4 4s.	3rd Prize . . .	£2 2s.
2nd „ . . .	£3 3s.	4th „ . . .	£1 1s.

Division II.—For Trade Growers.

Class 7.—Collection of 100 Hyacinths in twenty named varieties, five blooms of each variety, grown in pots or glasses.

Prize—The Gold Medal of the General Bulb Growers' Society of Haarlem.

Class 8.—Collection of 120 Hyacinths in twelve varieties in pans, ten

roots of one variety in each pan. The bulbs need not have been actually grown in the pans they are shown in.

Prize—The Gold Medal of the General Bulb Growers' Society of Haarlem.

Regulations.—For Classes 3, 4, and 5 each bulb must be in a separate pot (size optional). Classes 3, 4, 5, and 6 must all be single spikes; no spikes may be tied together. Exhibitors may compete in one only of the classes numbered 3, 4, and 5. All bulbs must have been forced entirely in Great Britain or Ireland. All varieties should be correctly named. Points will be deducted for all incorrect names.

BULBS GROWN IN MOSS FIBRE.

Subject to the general rules of the Society the Council offer the following prizes, presented to them by Mr. Robert Sydenham.

Class 9.—Bulbs grown in Moss Fibre or similar material (not earth) and without drainage.

AMATEURS.

Class 10.—Six single Hyacinths, in separate vases, not exceeding six inches in diameter, to be selected from any one of the following varieties: 'Enchantress,' 'General de Wet,' 'Innocence,' 'Jacques,' 'Johan,' 'King Alfred,' 'King of the Blues,' 'Koh-i-Noor,' 'Lady Derby,' 'Ornament Rose,' 'Princess May,' 'Roi des Belges,' 'Rose à Merveille,' 'Schotel.'

Prizes, 21s., 17s. 6d., 15s., 10s. 6d., 7s. 6d.

Class 11.—Six vases of Tulips (vases not exceeding seven inches in diameter), no restriction as to the number of bulbs in a vase, to be selected from the following: 'Duchesse de Parma,' 'Fabiola,' 'Joost van Vondel,' 'Keizerskroon,' 'Le Réve,' 'Mon Trésor,' 'Prince of Austria,' 'Queen of the Netherlands,' 'Rose Luisante,' 'Van der Neer,' 'Vermillion den Brilliant,' 'White Joost van Vondel.'

Prizes, 21s., 17s. 6d., 15s., 10s. 6d., 7s. 6d.

Class 12.—Six vases of Narcissi (vases not exceeding seven inches in diameter), no restriction as to the number of bulbs in a vase, to be selected from the following: 'Albatross,' 'Blood Orange,' 'Bullfinch,' 'C. J. Backhouse,' 'Dairymaid,' 'Early Easter,' 'Emperor,' 'Glitter,' 'Horace,' 'Leonie,' 'Lilian,' 'Lucifer,' 'Lulworth,' 'Madame de Graaff,' 'Red Coat,' 'Red Flag,' 'Shooting Star,' 'Victoria,' 'White Lady.'

Prizes, 21s., 17s. 6d., 15s., 10s. 6d., 7s. 6d.

If there are more than six exhibits in either of the classes an extra prize of 7s. 6d. will be given in such class if there are eight exhibits; a further 7s. 6d. if there are ten exhibits, and so on in the proportion of one prize for every two exhibits exceeding six in each class.

26. EXAMINATIONS, 1912.

1. The Annual Examination in the Principles and Practice of Horticulture will be held on March 27, 1912. The Examination has two

divisions, viz. (a) for Candidates of eighteen years of age and over, and (b) for Juniors *under* eighteen years. Particulars for 1912 may be obtained by sending a stamped and directed envelope to the Society's Offices. Copies of the Questions set from 1898 to 1910 (price 2s. post free) may also be obtained from the Office. The Society is willing to hold an Examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to examinations will consent to supervise one on the Society's behalf.

The Examination will not be held outside the British Isles until further notice.

In connexion with this Examination a Scholarship of £25 a year for two years is offered by the Worshipful Company of Gardeners, to be awarded after the 1912 Examination to the student who shall pass highest, if he is willing to accept the conditions attaching thereto. The main outline of these conditions is that the holder must be of the male sex, and between the ages of 18 and 22 years, and that he should study gardening for one year at least at the Society's Gardens at Wisley, conforming to the general rules laid down there for Students. In the second year of the Scholarship he may, if he like, continue his studies at some other place at home or abroad which is approved by the Council of the Society. In case of two or more eligible Students being adjudged equal, the Council reserve to themselves the right to decide which of them shall be presented to the Scholarship.

2. The Society will also hold an Examination in Cottage Gardening on April 17, 1912. This Examination is intended for, and is confined to, Elementary and Technical School Teachers. It is undertaken in view of the increasing demand in country districts that the Schoolmaster shall be competent to teach the elements of Cottage Gardening, and the absence of any test of such competence. The general conduct of this Examination is on similar lines to that of the more general Examination. Questions on Elementary Chemistry and Biology are included in this Examination.

Medals and Certificates are awarded and Class Lists published in connexion with these Examinations. The Syllabus may be obtained on application to the Secretary, R.H.S., Vincent Square.

27. INFORMATION.

Fellows may obtain information and advice from the Society as to the names of flowers and fruit, on points of practice, insect and fungoid attacks, and other questions, by applying to the Secretary, R.H.S., Vincent Square, Westminster, S.W. Where at all practicable it is particularly requested that letters and specimens may be timed to reach Vincent Square by the first post on the mornings of the Fortnightly Meetings, so as to be laid before the Scientific or other Committees at once.

28. INSPECTION OF FELLOWS' GARDENS.

The Inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and

advises at the following cost, viz. a fee of £8 8s. for one day (or £5 5s. for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their gardens. Gardens can only be inspected at the *written* request of the *owner*.

29. AFFILIATION OF LOCAL SOCIETIES.

One of the most successful of the many new branches of work undertaken since the reconstruction of the Society in 1887 is the unification of local Horticultural Societies by a scheme of affiliation to the R.H.S. Since this was initiated no fewer than 800 Societies have joined our ranks, and the number is steadily increasing.

To the privileges of Affiliated Societies have been added all the benefits accruing under the scheme recently introduced for the Union of Horticultural Mutual Improvement Societies.

Secretaries of Affiliated Societies can obtain on application a specimen of a Card which the Council have prepared for the use of Affiliated Societies for Certificates, Commendations, &c. Price 8s. 6d. for 10 copies, 5s. 6d. for 20, 11s. 6d. for 50, 20s. for 100.

The Council have also struck a special Medal for the use of Affiliated Societies. It is issued at cost price in Bronze, Silver, and Silver-gilt—viz. Bronze, 5s. 6d., with case complete; Silver, 12s. 6d., with case complete; Silver-gilt, 16s. 6d., with case complete. Award Cards having the Medal embossed in relief can be sent with the Medal if ordered, price 6d. each.

30. AFFILIATED SOCIETIES' EXHIBIT CARDS.

As an outcome of a suggestion made to the Secretary, stiff cards are being printed bearing descriptions of excellence of various fruits, flowers and vegetables, as appearing in the Code of Rules for Judging.

The intention is that these cards should be put up conspicuously at every Show amongst the exhibits referred to. Their educational value will be easily seen; for Show visitors, instead of viewing exhibits with little or no idea of what constitutes excellence, will have before them the "points" from a Judge's standard. Thus they will see for themselves where an exhibit has succeeded or failed, and in what direction their own efforts should be turned if they are to become prize-winners. These cards will be issued at the lowest possible cost. For further particulars and prices, see "Notices to Fellows" in the next JOURNAL.

31. UNION OF HORTICULTURAL MUTUAL IMPROVEMENT SOCIETIES.

This Union has been established for the encouragement and assistance of Horticultural Mutual Improvement Societies, the object being to strengthen existing Societies, to promote interchange of lecturers, to

provide printed lectures, and if possible to increase the number of these useful Societies.

A new and revised list of lecturers and their subjects, and a list of typewritten lectures, with or without lantern slides, prepared by the Society, may be obtained from the Secretary, R.H.S., price 8d.

Lantern slides on horticultural topics are much needed, and their gift will be very much appreciated.

32. RULES FOR JUDGING—1911 CODE.

The "Rules for Judging, with Suggestions to Schedule Makers and Exhibitors," have been revised, and the new edition is now ready. Special attention is drawn to the amended Rule defining "an amateur," with suggestions for establishing four distinct classes of amateurs to meet the requirements of larger or smaller local Societies. (See also p. 168, "Book of Arrangements.") The "pointing" recommended for fruits and vegetables has also been considerably amended, and the terms "annuals" and "biennials" further explained. The secretaries of local Societies are advised to obtain a fresh copy. It will be sent post free on receipt of a postal order for 1s. 6d., addressed to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W.

Exhibitors of vegetables are specially warned that the numbers of specimens to a dish appearing on p. 19 of the 1909 Code of Rules have been still further modified.

33. SPRAYING OF FRUIT TREES.

The Report of the Conference on the Spraying of Fruit Trees, held in the R.H.S. Hall on October 16, 1908, may still be obtained at the Society's Offices, Vincent Square, Westminster, price 1s. The book deals with the methods of spraying fruit trees for both insect and fungus pests, with information as to washes and spraying machinery, and forms the latest collated information on this subject.

34. VARIETIES OF FRUITS.

Many people plant fruit trees without a thought of what variety they shall plant, and as a result almost certain disappointment ensues, whilst for an expenditure of 2d. they can obtain from the Society a little 16-page pamphlet which contains the latest expert opinion on Apples, Pears, Plums, Cherries, Raspberries, Currants, Gooseberries, and Strawberries, together with Notes on Planting, Pruning, and Manuring, which for clearness of expression and direction it would be impossible to surpass. It has in fact been suggested that no other 16 pages in the English language contain so much and such definite information. At the end of the pamphlet are given the names of some of the newer varieties of fruits, which promise well, but are not yet sufficiently proved to be recommended for general planting.

Copies of this pamphlet for distribution may be obtained at the

Society's Office, Vincent Square, Westminster. Price, post free: single copy, 2*d.*, or 2*s.*; 5*s.*; 10*s.*; 100, 4*s.*

35. PLANTS CERTIFICATED.

The last-published list of "Plants Certificated by the Society" commenced with the year 1859 and closed with 1899. A further 11 years have now passed and the Council have republished the list up to the end of 1910, constituting a record of all the plants which have received awards during the past 50 years. The completed list will be of great assistance to amateurs and an absolute necessity to raisers and introducers of new plants. It is now ready, price 2*s.* post free, not including Orchids.

ORCHIDS CERTIFICATED.

The list of awards made to Orchids, with parentage, &c., has recently been published separately, and may be obtained at the Society's Office, Vincent Square, Westminster, bound in cloth and interleaved, price 5*s.* net.

36. RECOGNITION OF DILIGENT INTEREST IN PLANTS.

The Council have founded a card of "Recognition of Diligent Interest in Plants." Issued in response to frequent applications by school authorities for some token of encouragement of work with plants amongst scholars, it is to be awarded to the boy or girl (or both) who, in the yearly school competitions in plant cultivation, or garden plot keeping, or Nature study, has secured the first prize. The cards are 12 inches by 8 inches, and may be had on application to the Secretary, R.H.S., Vincent Square, London, S.W. (price 6*d.* each). The application should contain information as to (a) the nature of the competition, (b) the number of competitors, (c) the judges, (d) the number of prizes awarded in the competition, (e) the full name of the first prize winner, and should be signed by the head teacher and a member of the education authority concerned. The Council of the R.H.S. will at their own absolute discretion grant or withhold this "recognition."

37. MS. FOR JOURNAL.

The Editor is always glad to receive suitable articles for issue in the JOURNAL from corresponding and other Fellows of the Society. It is thought that much more might be done in this direction to disseminate valuable botanical and horticultural information, and to publish records of work and research conducted by other than actual official members of the Society. The JOURNAL is received by the best libraries in the world, and is regularly sent to all the 12,000 Fellows of the Society.

38. ADVERTISEMENTS.

Fellows are reminded that the more they can place their orders with those who advertise in the Society's Publications the more likely others are to advertise also, and in this way the Society may be indirectly benefited.

39. SHIRLEY POPPIES.

The Secretary will be pleased to send a packet of his 1911 crop of Shirley Poppy Seed to Fellows who like to send to Rev. W. Wilks, Shirley Vicarage, Croydon, a stamped envelope ready addressed to themselves. The seed should be sown as early as possible in March. This is an offer made by the Secretary in his private capacity, and it causes much inconvenience when requests for seed are mixed up with letters sent to the office in London instead of as above directed.

40. INTERNATIONAL HORTICULTURAL EXHIBITION, MAY 22-30, 1912.

Most of the Fellows of the Society will have already heard that an Association has been formed to organize an International Flower Show in London next spring, as the outcome of a suggestion made by the Council in their Report for the year 1909, that such a courtesy on the part of Great Britain was due (or indeed overdue) to the Continent and to America for the many similar hospitalities which foreign countries have offered to British horticulturists.

It must be fully understood and constantly borne in mind that the Royal Horticultural Society is not organizing the Exhibition, nor in any way responsible for anything connected therewith. All responsibility rests with the Directors as in every other public Company. Fellows are, therefore, asked to recognize the Exhibition as being absolutely distinct from the Society, being, in fact, an entirely separate and independent organization. The Society has, however, welcomed the proposal that such an International Exhibition should be held, and it will render the Association every assistance in its power.

The Association, recognizing the importance of securing the great weight of horticultural interest vested in the Society, have approached the Council with a view to establishing a suitable friendly working arrangement between the two bodies, and—

(a) The Royal Horticultural Society has agreed—

1. To contribute £1,000 towards the expenses of promoting the International Exhibition; and
2. To guarantee a further sum of £4,000 against the contingency of there being an ultimate loss on the Exhibition.

(b) The Directors of the International Exhibition Association have agreed—

1. To give to all Fellows of the Society certain special and definite privileges over the General Public in regard to the purchase of tickets for the Exhibition; and
2. To allow all such tickets purchased by Fellows of the Society to be transferable.

The cost of organizing the International will, we understand, reach nearly, if not quite, £25,000—a very heavy responsibility for the Directors to face; but they are doing so, relying on the support of all British lovers of gardens, and especially of the Fellows of the Royal Horticultural Society.

ADMISSION ARRANGEMENTS.

The Directors of the International Exhibition Association have decided on the following prices of admission for the General Public:—

	Before 5 P.M.	5 to 10 P.M.		All day.
May 22 . . .	£2 2s. . .	£1 1s. . .	May 27 . . .	2s. 6d.
„ 23 . . .	£1 1s. . .	10s. . .	„ 28 . . .	1s.
„ 24 . . .	10s. . .	5s. . .	„ 29 . . .	1s.
„ 25 . . .	5s. . .	2s. 6d. . .	„ 30 . . .	1s.

FELLOWS OF THE R.H.S.

The special privileges accorded to Fellows of the Royal Horticultural Society are as follows:—

Fellows of the R.H.S. paying an Annual Subscription of	MAY 22	MAY 23	MAY 24, 25, 27	MAY 28, 29, 30
£4 4s., or £4 4s. Life Fellows	Two tickets at half-price	and Two tickets at half-price at either hour	and Four tickets for any, but only one, of these days; with two additional tickets for May 25—all at half-price	No reduction
£2 2s., or £2 2s. Life Fellows	One ticket at half-price	and One ticket at half-price at either hour	and Two tickets for any, but only one, of these days; with one additional ticket for May 25—all at half-price	No reduction
£1 1s., or Life Fellows	One ticket at 30s.; or at 10s. 6d. after 5 P.M.	and One ticket at half-price for any, but only one, of these four days		No reduction
Honorary and Corresponding Members	The same privileges as £2 2s. Fellows			
Associates	No reduction		One ticket on May 25 or 27 at half-price.	No reduction
£1 1s. Affiliated Societies £2 2s. Aff. Soc. double privileges	No reduction		Ten tickets on May 25 and 16 tickets on May 27—all at half-price	No reduction

N.B.—All privileged tickets in accordance with the above scale for R.H.S. Fellows, &c., must be purchased on or before May 18, and can only be obtained direct from the office of the Royal Horticultural Society, Vincent Square, Westminster, S.W.

All the above special tickets will be transferable, but will each be available for one admission only. Fellows can, therefore, circulate among their friends such of the tickets as they do not personally require. Cheques or postal orders payable to the Royal Horticultural Society must accompany every application for tickets, and tickets when once purchased cannot be exchanged for others of a different date. See following pages. Letters of inquiry must contain an envelope ready addressed and stamped.

£4 4s. FELLOWS

AND THE INTERNATIONAL HORTICULTURAL EXHIBITION.

£4 4s. FELLOW'S APPLICATION FOR TICKETS.

Being a Fellow of the Royal Horticultural Society paying £4 4s. a year (or £4 4s. Life), I hereby apply for tickets of admission to the International Horticultural Exhibition as indicated in the list below, in accordance with the privileged prices allowed to Fellows (see schedule on p. cclxxvi.).

Please fill up very carefully, placing in ink the necessary figures in the right-hand column left for the insertion of the ticket-values, according to the days selected. (See schedule on p. cclxxvi.)

Please strike through with a pen all the tickets mentioned below for which you do NOT apply, so that it may be quite clear which you want.

£ s. d.

You are allowed one, or two (not more) Tickets for
May 22 at £1 1s. each, or if after 5 P.M. at 10s. 6d.

You can also have one, or two Tickets for
May 23 at 10s. 6d. each, or if after 5 P.M. at 5s.

You can also choose not more than four Tickets out of
the following list :—

May 24, at 5s. each, or 2s. 6d. after 5 P.M.

May 25, at 2s. 6d. each, or 1s. 3d. after 5 P.M.

May 27, at 1s. 3d. all day

You can also have two additional Tickets for

May 25 at 2s. 6d. each all day ; no further reduction on these two additional after 5 P.M.

A remittance is enclosed herewith for £

Signed

Please write very distinctly.

Address

Date

This application must be sent to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, so as to reach him not later than May 18, 1912, after which date no tickets can be issued by the Society at the privileged rates, under their agreement with the Directors of the International Exhibition.

Nota Bene.—If more tickets are desired than are allowed above under the Society's agreement with the International Directors, they cannot in any case be obtained from the R.H.S., but must be applied for from the Secretary of the International Exhibition, 7 Victoria Street, Westminster, and the full price as charged to the public must be paid.

£2 2s. FELLOWS

(ALSO HONORARY AND CORRESPONDING MEMBERS)

AND THE INTERNATIONAL HORTICULTURAL EXHIBITION.

APPLICATION FOR TICKETS FROM £2 2s. FELLOWS AND HONORARY
AND CORRESPONDING MEMBERS.

Being a Fellow of the Royal Horticultural Society paying £2 2s. a year (or £2 2s. Life, or an Honorary or Corresponding Member), I hereby apply for tickets of admission to the International Horticultural Exhibition as indicated in the list below, in accordance with the privileged prices allowed to Fellows (see schedule on p. cclxxvi.).

Please fill up very carefully, placing in ink the necessary figures in the right-hand column left for the insertion of the ticket-values, according to the days selected. (See schedule on p. cclxxvi.)

Please strike through with a pen all the tickets mentioned below for which you do NOT apply, so that it may be quite clear which you want.

£ s. d.

You are allowed one Ticket for

May 22 at £1 1s., or if after 5 P.M. at 10s. 6d.

You can also have one Ticket for

May 23 at 10s. 6d., or if after 5 P.M. at 5s.

You can also choose not more than two Tickets out of
the following list :—

May 24, at 5s. each, or 2s. 6d. after 5 P.M.

May 25, at 2s. 6d. each, or 1s. 3d. after 5 P.M.

May 27, at 1s. 3d. all day

You can also have one additional Ticket for

May 25 at 2s. 6d. all day ; no further reduction
on this additional ticket after 5 P.M.

A remittance is enclosed herewith for £

Signed

Please write very distinctly.

Address

Date

This application must be sent to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, so as to reach him not later than May 18, 1912, after which date no tickets can be issued by the Society at the privileged rates, under their agreement with the Directors of the International Exhibition.

Nota Bene.—If more tickets are desired than are allowed above under the Society's agreement with the International Directors, they cannot in any case be obtained from the R.H.S., but must be applied for from the Secretary of the International Exhibition, 7 Victoria Street, Westminster, and the full price as charged to the public must be paid.

£1 1s. FELLOWS
AND THE INTERNATIONAL HORTICULTURAL EXHIBITION.

£1 1s. FELLOW'S APPLICATION FOR TICKETS.

Being a Fellow of the Royal Horticultural Society paying £1 1s. a year (or £1 1s. Life), I hereby apply for tickets of admission to the International Horticultural Exhibition as indicated in the list below, in accordance with the privileged prices allowed to Fellows (see schedule on p. cclxxvi.).

Please fill up very carefully, placing in ink the necessary figures in the right-hand column left for the insertion of the ticket-values, according to the days selected. (See schedule on p. cclxxvi.)

Please strike through with a pen all the tickets mentioned below for which you do NOT apply, so that it may be quite clear which you want.

£ s. d.

You are allowed one Ticket for

May 22 at £1 10s., or if after 5 P.M. at 10s. 6d.

You can also choose one Ticket (not more) out of the following list:—

May 23 at 10s. 6d., or if after 5 P.M. at 5s.

May 24 at 5s., or after 5 P.M. 2s. 6d.

May 25 at 2s. 6d., or after 5 P.M. 1s. 3d.

May 27 at 1s. 3d. all day

A remittance is enclosed herewith for £

Signed

Please write very distinctly.

Address

Date

This application must be sent to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, so as to reach him not later than May 18, 1912, after which date no tickets can be issued by the Society at the privileged rates, under their agreement with the Directors of the International Exhibition.

Nota Bene.—If more tickets are desired than the one allowed above under the Society's agreement with the International Directors, they cannot in any case be obtained from the R.H.S., but must be applied for from the Secretary of the International Exhibition, 7 Victoria Street, Westminster, and the full price as charged to the public must be paid.

ASSOCIATES
AND THE INTERNATIONAL HORTICULTURAL EXHIBITION

ASSOCIATE'S APPLICATION FOR TICKETS.

Being an Associate of the Royal Horticultural Society, I hereby apply for a ticket of admission to the International Horticultural Exhibition as indicated in the list below, in accordance with the privileged prices allowed to Associates (see schedule on p. cclxxvi.).

Please fill up very carefully, placing in ink the necessary figures in the right-hand column left for the insertion of the ticket-values, according to the days selected. (See schedule on p. cclxxvi.)

Please strike out with a pen the one you do NOT want.

You may select either one of these two alternatives (a)
or (b)—

	Special Rate for Associates.	£	s.	d.
(a) One Ticket for May 25 at 2s. 6d.				
or				
(b) One „ „ May 27 „ 1s. 8d.				

A remittance is enclosed herewith for £

Signed

Please write very distinctly.

Address

Date

This application must be sent to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, so as to reach him not later than May 18, 1912, after which date no tickets can be issued by the Society at the privileged rates, under their agreement with the Directors of the International Exhibition.

Nota Bene.—If more tickets are desired than the one allowed above under the Society's agreement with the International Directors, they cannot in any case be obtained from the R.H.S., but must be applied for from the Secretary of the International Exhibition, 7 Victoria Street, Westminster, and the full price as charged to the public must be paid.

Notice also.—The Directors of the International grant special terms to *bona fide* working gardeners, for which apply to International Secretary, 7 Victoria Street, S.W.

AFFILIATED SOCIETIES AND THE INTERNATIONAL HORTICULTURAL EXHIBITION.

AFFILIATED SOCIETY'S APPLICATION FOR TICKETS.

The Society, being affiliated with or in union with the Royal Horticultural Society, we, the President and Secretary, hereby apply for tickets of admission to the International Horticultural Exhibition as indicated in the list below, in accordance with the privileged prices allowed to "Affiliated Societies" (see schedule on p. cclxxvi.).

		Special Rate for Affiliated Societies.	£	s.	d.
No.	Tickets (not exceeding ten) for				
	May 25 at	2s. 6d.			
	and				
No.	Tickets (not exceeding sixteen) for				
	May 27 at	1s. 8d.			

A remittance is enclosed herewith for £

Affiliated Societies subscribing £2 2s. a year are entitled to twice the number of tickets above indicated.

Signed

President.

Secretary.

Please write very distinctly.

Secretary's Address

Date

This application must be sent to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, so as to reach him not later than May 18, 1912, after which date no tickets can be issued by the Society at the privileged rates, under their agreement with the Directors of the International Exhibition.

Nota Bene.—If more tickets are desired than are allowed above under the Society's agreement with the International Directors, they cannot in any case be obtained from the R.H.S., but must be applied for from the Secretary of the International Exhibition, 7 Victoria Street, Westminster, and the full price as charged to the public must be paid.

If less than the 26 tickets allowed above are required, a smaller number at *pro rata* prices can be ordered.

Notice also.—The Directors of the International grant special terms to all *bona fide* working gardeners, for which apply to International Secretary, 7 Victoria Street, S.W.

INTERNATIONAL EXHIBITION, 1912,
AND THE ROYAL HORTICULTURAL SOCIETY.

SUBSCRIBERS and GUARANTORS to the International Exhibition, 1912, who happen to be Fellows of the Royal Horticultural Society, are requested to understand clearly that the privileges they become entitled to in return for their contribution to the International have nothing whatever to do with the R.H.S. With reference to such privileges they must correspond only with the International.

On the other hand, the privileges to which FELLOWS of the Society are entitled are a result of the arrangement made by the Council of the R.H.S. with the Executive of the International, and sanctioned by a General Meeting of the Society; the distribution of these privileges will be made entirely by the officers of the R.H.S., the officers of the International having nothing whatever to do with the carrying out of the details of arrangement.

Consequently,

1. For all matters relating to, or connected with, Subscription or Guarantee to the International Exhibition, address, Ed. White, Esq., Hon. Director, International Exhibition, 7 Victoria Street, Westminster; and

2. For all matters relating to privileges pertaining to anyone as a Fellow of the Royal Horticultural Society, address Secretary, R.H.S., Vincent Square, S.W.

It will further be seen from this, that —

3. If a Fellow of the R.H.S. subscribes, say, £10 10s. to the International, obtaining thereby the privilege of tickets for the International to the value of £12 12s., the number of tickets to be issued by the International in respect of that £12 12s. cannot be computed on the basis of the arrangement made with the R.H.S., but must be calculated simply on their face value to the General Public, and will be sent direct from the International Offices, 7 Victoria Street, Westminster.

ED. WHITE,
Hon. Director International, 1912.

W. WILKS,
Secretary, R.H.S.

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